



Sp. Pistole.



Johannes Port.



Johannes Port.



1/2 Moidore, Port.



Fr. Guinea.



Br. Guinea.



Eng. by A. Reed.





Sp. Pistole.



Johannes Port.



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1/2 Moidore, Port.



Fr. Guinea.



Br. Guinea.



Eng. by A. Reed.

THE  
American Accomptant;  
BEING  
A PLAIN, PRACTICAL AND SYSTEMATIC  
COMPENDIUM  
OF  
FEDERAL ARITHMETIC;  
IN THREE PARTS:  
DESIGNED FOR THE USE OF SCHOOLS,  
AND SPECIALLY CALCULATED FOR THE  
COMMERCIAL MERIDIAN  
OF  
THE UNITED STATES OF AMERICA.

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BY CHAUNCEY LEE, A. M.

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## RECOMMENDATIONS.

*Rutland, (Vermont) February 7, 1797.*

**W**E have perused and examined the following work, entitled "The American Accomptant, &c." by Chauncey Lee, A. M. and are of opinion it is calculated very greatly to facilitate the learning of Arithmetic, in its various branches;—that, in many of the branches, it proposes a more simple, as well as more compendious method, than has yet been adopted;—that it will be extensively useful to men of business, and is particularly calculated for usefulness in the United States.

NATHANIEL CHIPMAN,  
ENOCH WOODBRIDGE,  
LOT HALL,

} *Judges of the Superior Court.*

*Williams College, (Mass.) March 9, 1797.*

**H**AVING examined, with some attention, the following work, entitled "The American Accomptant," by the Rev. Chauncey Lee, A. M. I am pleased both with the plan and the execution of it; and think it calculated to promote the knowledge of Arithmetic among the Youth in our common schools, in a more easy and expeditious manner than any work of the kind now in use. In some branches it proposes new rules, which are highly recommended by their simplicity and conciseness; and, on many accounts, appears calculated for extensive usefulness among men of business in the United States.

EBENEZER FITCH, *President of Williams College.*

**H**AVING perused, in manuscript, the American Accomptant, by the Rev. Chauncey Lee, I find many things therein attended to of much consequence, and a number of judicious remarks on long established customs, with alterations proposed; which, should they obtain in common practice, according to the even-

tual probability, would very much simplify many of our computations, by making all less denominations of integral parts more generally descend upon a decimal scale, agreeably to the author's plan.

Conceiving it to be a work of merit, I am therefore of opinion, the general plan will meet with the approbation of the public—it being so happily adapted to the capacities of young students, and first beginners in *Arithmetic*, that it cannot fail in communicating to them just ideas, and a due comprehension of the foundation principles of that first branch of the *Mathematics*.

SAMUEL MOORE, County Surveyor.  
Salisbury, (Connecticut) March 3, 1797.

*Copy of a letter from the Reverend JOB SWIFT, to the Author.*

Bennington, March 21, 1797.

Dear Sir,

THE manuscript copy of your "Compendium of Federal Arithmetic," with which you favored me, I have examined with attention; and, as you requested my observations upon it, I cheerfully express my warmest approbation of the work, both with respect to its general plan, and also the several novel rules and arrangements introduced as improvements in its various branches.—In a word, I conceive it to be judiciously calculated to answer the valuable purposes mentioned in your proposals, "the more easy instruction of Schools, and the benefit of young gentlemen in all occupations."

Accept, Sir, my best wishes for the success of your undertaking; and, should my name be thought of any consideration in the premises, it is freely at your service.

I NO 61  
Yours, &c.

JOB SWIFT.

Rev. Mr. Lee.

## INTRODUCTION.

THE work contained in the following sheets, was originally begun with no further design than as a short catechism upon the first rules of Arithmetic, for the instruction of a particular school; but finding it open an extensive field of practical Arithmetic, and a door for many *apparent* improvements, so necessary to meet the exigencies of school education in general, which arise from the present peculiar commercial circumstances of our Country; I was induced to extend my plan, and continue the work to that serious length which is now presented to the public eye in the size of a volume.

I shall not affect to entertain my readers, with all the customary apologies for a new publication. The work will speak for itself. That it has its full share of imperfections I have not a doubt. If it possess any merit, the candid Instructor, and the intelligent MAN OF BUSINESS, will readily discern it— if it be undeserving of attention, the consequences are as obvious; and in either case apologies would be impertinent. In this view of it, I have only to say, that I have spared no application nor pains in my power to insure the highest object of publication, *the benefit of my country*. How far I have succeeded, is humbly submitted, with the assurance that I shall not only receive the criti-



cisms of candor without a wound, but feel indebted to the friendly hand that shall point me to its defects.

Lest any one should entertain a mistaken idea of the *design* of this compendium, and hence be lead to expect many things in it which he will not find ; I would here apprise him, that I have attempted in it to treat of and simplify the system of *commercial* arithmetic only—to render many of its rules more easy and concise, and better adapted to the instruction of young minds in the method and progress of common school education. With this view, I have omitted several rules contained in former Arithmetical treatises, that are perhaps more calculated either to amuse or puzzle, than to profit the common school student, or at least are inapplicable or unnecessary to trade and business, and the common affairs of human life ; and added others in their stead designed to facilitate and promote these important, practical objects. In a word, without aspiring to the higher branches, and more intricate rules and researches of the art, which indeed are rendered unnecessary, by the labors and publications of abler hands, this compendium is designed as an easy guide to the young student—an useful Assistant to the common school Instructor, and to the man of business in all the variety of commercial transactions.

Sensible, however, that all innovations upon old rules and long established modes of

instruction or practice have to combat the united force of prejudice and habit; are viewed with a suspicious eye, and received with a cautious hand, I conceive it a duty, I owe both to the public and myself, to exhibit the reasons and grounds upon which I have ventured to project such a variety of alterations as appear in the following work. Whilst thus assuming the burden of proof, I have only to request the reader's patient attention, and that he would not uncandidly pass sentence before trial, but first examine and then judge.

There is, I conceive, this imperfection in the mode of most Arithmetical authors who have published, that is, not to have treated with sufficient explicitness and perspicuity upon the first principles and fundamental rules, so as to render them palpable to the understanding of the new beginner—but taking many things for granted, as already well known and understood, tho' needing at the same time as particular explanation as the more abstruse and complicated parts, the student, as he proceeds, is subjected to the arduous task of erecting a superstructure without a foundation.

Hence too originates a similar error, I mean, a superficial mode of instruction in many of the common schools. The boy, advanced perhaps some way in his *teens*, is sent to a winter school for two or three months to complete his education; for he cannot attend

in any other season, nor then indeed but quite unsteadily. But as he is almost a man he must go to school to *cypher*; and as he has but a short time for the business he must *cypher* fast. He goes to school, vulgarly speaking *raw*, perhaps scarcely able to form an arithmetical figure. His master *sets him a sum* in addition, and it may be tells him he must *carry one for every ten*; but why, is a mystery which neither master nor scholar gives himself any trouble about; however, with a deal of pains, he at length gets his *sum done*, without ever being asked, or knowing how to read the sum total, or any number expressed in the statement.\* But it is *cyphering*, and that is sufficient. If he is taught to commit any of the rules to memory, he learns them like a parrot, without any knowledge of their reason, or application. After this manner he gropes along from rule to rule, till he ends his blind career with the *Rule of Three*; and in the end, the only and the truest account he can give of the whole is, that he has been *over it*. But he has completed his school education, and is well qualified to teach a school himself, the next winter after.

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\* As a striking example of this method of instruction, I have actually known a lad of eighteen, who, after having, in this way, gone over all the first rules of Arithmetic, at a common school, was utterly unable to read or enumerate any number consisting of four places of figures.



This representation however is not meant to be generally applied. On the contrary I have the pleasing satisfaction to believe that the mode of common school education in this country has of late years been much improved and is still improving; and it is the design and wish of the author to contribute his mite for the furtherance of so desirable an object.

To remedy the aforementioned defects, it appears highly necessary that the elementary parts of Arithmetic should be accurately explained and clearly distinguished—their various combinations pointed out—the reason of every rule explained to the understanding of the student, and the whole system analysed with exactness and precision. Our knowledge of any art or science is not born with us, but acquired—the acquisition is progressive and not immediate—we proceed step by step—from small to greater, from simple to complex. The foundation must be laid, before the superstructure can be raised. The child must first learn the alphabet before he can read or spell; and that mode of study and instruction is confessedly the most judicious, which places each step in its natural and just order, and casts the strongest light upon the intimate connexion and mutual subserviency of the several parts.

These were my reasons for adopting sundry alterations of method to simplify the first rules, and classing each part in short and easy lessons, which, expressed in ques-

tions and answers, may be thoroughly studied, regularly recited and easily retained.

NOTATION is the first step. This is as it were the A, B, C of Arithmetic, and bears the same important relation to all the following rules, which the Alphabet does to the art of reading. Let the learner therefore, after writing figures enough to be able to form them handsomely and place them orderly, acquaint himself well with this rule, by attending to the Numeration Table—the names and order of the several denominations of whole numbers—their mode or ratio of increase in value as he names the figures either from right hand to left, or from left hand to right—the use and effect of cyphers interjected between significant figures, or digits, &c. and also by the exercise of expressing written numbers in figures and the reverse; paying the like attention as he proceeds, to the notation of mixed quantities.

ADDITION is the next in order. In this the learner begins to calculate the operation and power of numbers expressed by figures in Notation. Let him begin with the easiest and plainest examples; with numbers whose aggregate shall not exceed *ten*—then let him proceed to larger sums of two or more figures, and next to the addition of the mixed quantities of money, weight, measure, &c. learning each table well by heart as he proceeds, together with their respective uses.—In the addition of whole numbers, let him



clearly see the reason and propriety of adding *one* to the left hand column, for every *ten* contained in its right hand one, setting down only the overplus of the tens. And also in the mixed quantities *one* for the *terminus* of each denomination to the next higher denomination, according to its table.

**SUBTRACTION.** Let the learner, in this also, begin with the simplest and easiest examples, where every lower figure expresses a smaller number than the one directly above it. When the lower figure is the larger, for instance, as in subtracting *nine* from *fifty-six*, placed <sup>56</sup> instead of going the circuitous route of saying 9 from 6 I cannot, but 9 from 10 leaves 1, and 6 is 7; and then 1 that I carry to 0 is 1, which from 5 leaves 4; let him, by a mere mental operation, subtract 1 from the left hand figure 5, and annexing the right hand one to it for 16, say at once, 9 from 16 leaves 7, and then the left hand figure in the remainder is 4, without any subtracting, borrowing or paying, standing 47. This I conceive to be a more simple, natural and easy mode, especially in whole numbers, than the former which is usually taught and practised. This is purely Subtraction, whilst *that* is Subtraction and Addition blended together.

These two last rules, both in integral and fractional quantities, are purely simple. In this I speak only of their mode of operation; and by this alone I distinguish between *simple*



and *compound* rules. The addition of *money*, *weight*, *measure*, &c. is performed by the operation of Addition *merely*, and is therefore as *simple* Addition as that of whole numbers. It is simple Addition of compound or mixed quantities. And on the other hand, there is compound Addition of simple as well as mixed quantities. The same also applies to subtraction. These distinctions, appearing to me just and forming a more accurate analysis of the first principles of the Art, I have ventured to make in the following work.

MULTIPLICATION, all excepting the Multiplication Table, so called, and in cases where the multiplier consists of a single figure whose square or product with each figure in the multiplicand does not exceed *nine*, is a compound of Multiplication and Addition. The new proposed method of *Cross Multiplication* is considered as an improvement in the art; and after the learner is first well versed in the common method, may, by a little practice, become equally familiar and easy. It is a general rule wherever the multiplier consists of a plurality of significant figures, and in every such case will be found of special utility in practice. There are several other curious methods of contracting Multiplication in certain cases, which, as they apply but to a few particular multipliers only, whose operation can but very seldom occur in practice, I have designedly omitted—judging those rules to be the most useful, and the best

adapted for the instruction of the learner, which are the most general in their application.

DIVISION, whether short or long, of simple or mixed quantities, in its mode of operation, is never simple, but is a composition of Division, Multiplication, Subtraction and Addition—unless we except merely the reverse of the Multiplication Table, where neither the divisor nor quotient exceed 12. And yet this becomes compounded as before whenever there is any remainder. The divisor is also a multiplicand, the quotient a multiplier, their product a subtrahend, and the dividend a substratum. In the proof by Multiplication, the quotient becomes the multiplicand, the divisor the multiplier, the last remainder, a sum to be added to their product; and the dividend the sum total.—The method of contracting long division by setting down only the remainders, may be easily attained and familiarized by practice, after the student has become well versed in the common method; accordingly I have used only these contracted modes of Multiplication and Division, in all the examples of the Second and Third Parts, where the operations are set down. The proposed method of proving Division as well as Multiplication by the *Ecks*, is calculated greatly to lessen the labor both of the Scholar and Instructor. Rules of proof in all cases, should be as concise as possible, consistently with

rectitude, and general application. Otherwise, if the operation of the proof be as lengthy and laborious as the work which it is designed to prove, it will not only form a heavy tax upon the students' time and patience, but oftentimes the testimony of the witness may be called in question and the proof itself equally want proof.

Our tables of weight and measure, (as all the parts, both of the ultimate and *mesne* integers, are in the ratio of vulgar fractions) are as illy contrived for ease of calculation and practical convenience as can well be imagined. Indeed, in my humble opinion, vulgar fractions are a very unimportant, if not useless part of Arithmetic, and decimals only of any considerable practical consequence.—All mixed quantities become obscure and intricate in calculation in the same proportion as they deviate from a decimal standard.—Their processes are indirect and in a greater or less degree difficult and uncertain. In this consists the wisdom and excellency of our Federal money currency, which, I am bold to say, is the highest pitch of improvement, to which money calculations can or will ever be brought. But, at the same time, it increases the above-mentioned inconvenience of mixed quantities, whilst continuing upon their present standard, through the want of an uniformity; and I am persuaded that experience will soon evince the expediency, if not the absolute necessity of federal-



izing all the tables of weights and measures, and other mixed quantities, which have an immediate relation to commerce, upon a decimal scale. There is no man, who has any knowledge of figures, but who will, by a minute's attention, perceive the inconvenience and difficulty of multiplying a vulgar and decimal fraction together, or of dividing the one by the other, without first expressing them both in vulgars, or both in decimals. This difficulty will be still increased, where the vulgar fraction is a compound fraction, or a fraction of a fraction, which is always the case where there is a plurality of denominations below the integer expressed in the given quantity. For instance, £ 1 : 13 :  $7\frac{3}{4}$  is £ 1 and  $\frac{13}{20}$  and  $\frac{7}{240}$  and  $\frac{3}{960}$  of a pound—these fractional parts of a pound, are also fractional parts of each other, each denomination of all its higher denominations. After the same manner also 1 *ton*, 9 *hundreds*, 3 *quarters* and 17 *pounds*, is 1 *Ton*, and  $\frac{9}{20}$  and  $\frac{3}{80}$  and  $\frac{7}{240}$  of a *Ton*. Now let the farmer, or any other man undertake to reckon the worth of the last mentioned quantity of hay, or any other article of produce valued by weight, at the price of 4 Dollars, 44 Cents and 4 Mills *per Ton*, without decimalizing those vulgar fractions, and he would find it a troublesome business. He must do it in one or the other of these two several ways, *viz.*

1. Add all the vulgar fractions of the given quantity together, by multiplying each

numerator and all the denominators but its own together, and taking the sum of those several products for a new numerator ; under which for a new denominator, write the product of all the denominators multiplied together, by which the several fractions are added into one simple fraction—Then,

Multiply the given price and the Numerator together ; divide their product by the Denominator, and that quotient add to the given price of a Ton.—Or,

2d. Multiply the given price three times successively, once by each of the several Numerators, and divide their products by their respective Denominators, and then add together all those quotients and the given price of a Ton.

For the satisfaction of the curious and the conviction of all, let the business be exemplified, and the operation of each of the foregoing rules drawn out in figures at length in answering the question,

*What is the worth of 1 T. 9 Cwt. 3 Qrs, 17 lb. of hay, at 4 Doll. 44 Cents and 4 Mills per Ton ?* from which every one may the better judge, for himself, of the conveniency of our present weights and measures—of the practical utility of Vulgar Fractions, and how much they are deserving of attention.

*By the 1<sup>st</sup> Rule :*

$$\begin{array}{r}
 1 \text{ Ton } \& \frac{9}{20} \text{ and } \frac{3}{80} \text{ and } \frac{17}{2240} \\
 \text{Mult. by } \frac{3}{60} \quad \text{Mult. by } \frac{17}{80} \quad \text{Mult. by } \frac{17}{80} \\
 \hline
 2240 \quad 560 \quad 179200 \\
 \hline
 \text{Mult. by } 60 \quad 1360 \quad \text{by } 9 \\
 \hline
 134400 \quad 27200 \quad \text{Several products add. tog.} \\
 \hline
 \begin{array}{l} 1612800 \\ 27200 \\ 134400 \end{array}
 \end{array}$$

New Numerator 1774400

Denominators Multiplied

$$\begin{array}{r}
 \text{By } \frac{2240}{80} \\
 \hline
 179200 \\
 \text{By } \frac{179200}{20} \\
 \hline
 \text{New Den. } 3584000
 \end{array}$$

The whole Fraction

$$\begin{array}{r}
 1774400 \\
 \hline
 3584000
 \end{array}$$

Then Mult. the Numerator 1774400

By Doll. 4.44 price of a Ton.

$$\begin{array}{r}
 70976 \\
 70976 \\
 70976 \\
 70976 \\
 \hline
 70976 \text{ doll. c. m.}
 \end{array}$$

Divide by 3584000 7885 | 433.600 ( 2. 20. 0

$$\begin{array}{r}
 7168 \text{ Add } 4. 44. 4 \\
 \hline
 7174 \text{ Answ. } 6^s 64. 4 \\
 7168
 \end{array}$$

Fraction thrown away 633600

*By the 2<sup>d</sup> Rule :*

$$1 \text{ Ton } \frac{9}{20}, \frac{3}{80}, \frac{17}{2240} \text{ at } 4d. 44c. 4m.$$

b 2



	4.444		4.444
1st Numr. Mult.	9	2d Numr. Mult.	3
1st Deno. Div.	2 0	2d D. Di.	8 0
Price of 9 Cwt.	D. 1.99.9 <sup>6</sup> / <sub>10</sub>	Prc. of 3qrs.	D. 0. 16. 6
	4.444	Prc. of a Ton.	4d. 44c. 4m
3d Numr. Mult.	17	of 9 cwt.	1. 99. 9
	31108	of 3qrs.	0. 16. 6
	4444	of 17lb.	0. 03. 3
3d Den. div.	22 0	7 5.548(.03.0	Ans. 6. 64. 2
	672		
	834		
	672		
	(1628)		

Price of 17lb. Doll. 0. 03. 3<sup>1628</sup>/<sub>240</sub>

Now let us compare the foregoing operations with the same example wrought by Decimals.

**Rule.** Multiply the commodity by the price ; from the product point off as many right hand figures as there were Decimals in the Multiplier and Multiplicand together, and the rest are Dollars.

9cwt. = .45		<i>Answers.</i>
3qrs. = .0375		By 1st Rule, D. 6. 64. 4
17lb. = .0075		By 2d ——— 6. 64. 2
		By Decimals 6. 64. 4
The whole } quantity	Ton 1.495	very nearly.
Multiply by Doll.	4.444	

5980  
 5980  
 5980  
 5980  
 6.64.3.780 *Answer.*

This last method of operation by decimals may still be shortened more than one half, by the aforementioned mode of Cross-multiplication, explained at large in the following work.

But still this mode of operation does not reach the highest pitch of improvement to which it might be carried by decimals. An inconvenience will arise from the difficulty of readily changing these compound vulgar fractions into decimals. The man of business may not always have his decimal table by him, or may be diffculted to remember the decimal ratio among so many various rules of decimal reduction; and so be obliged to divide all the numerators by their denominators, in order to find the decimals: and this inconvenience, though smaller than the former, will ever continue to operate in a greater or less degree, until this *vulgar* evil is plucked up by the very roots—all these surd, untoward fractional numbers banished from practice and the several denominations in all commercial tables of mixed quantities conformed to our Federal money, and established upon a decimal scale. To accomplish all this is a task too great for any individual in a republican government. It requires the arm of Congress to effect it; and it is equally to be hoped as expected, that their wisdom and patriotism will not be inattentive to so important an object of legislation.

These considerations, however, have induced me to suggest some hints for this kind of arithmetical improvement, in a work denominated Federal Arithmetic, and to come forward as a *projector* simply, in exhibiting to public view a plan of federalizing weights and measures, as well as money, upon a decimal scale; and illustrating their utility by a variety of practical examples under each. As none of them excepting Federal Troy-weight alters the quantity of the ultimate integer, they might, if approved, be reduced to practice by merchants and others, even without legislative aid. This would enable them to keep their books, both as to commodities and prices, in decimals; and the practice, I am persuaded, would abundantly realize the benefits of the mode.

The following scheme is therefore humbly submitted to the judgment of every candid American.

AVOIRDUPOIS-WEIGHT.—Of this we have two kinds in use, tho' both weighed by the same steelyards and weights. These are commonly distinguished by the terms *gross* weight and *neat* weight. The former, which makes an hundred pounds weight to consist of 112, I must confess, appears perfectly needless, childish and nonsensical, and to be continued in practice merely thro' the force of blind habit and arbitrary custom, without a single good reason for it existing. Liability to waste is the most plausible, and perhaps the



only reason which can be assigned : but many articles, such as metals, which are the least liable to waste, are weighed by this standard. If this were a just reason, why would not the same end be better answered by deducting  $\frac{12}{112}$  from the *price* of a hundred weight, and thereby avoid this inconvenient mode of reckoning, and the absurdity of calling 112 only 100. Thus, for instance, whatever article sells for 1 dollar *per cwt.* gross; take 11 from an hundred, which is about the proportion, and call the price 89 cents; then let the same pound upon the steelyards be divided into *ten* instead of sixteen notches; and omitting the useless denomination of quarters, we might form, as follows, the Table of

#### FEDERAL AVOIRDUPOIS.

10 drams	make	1 ounce
10 ounces	-	1 pound
100 pounds	-	1 hundred weight
10 hundreds	-	1 thousand.

#### TROY WEIGHT, *federalized.*

Let the weight of a Dollar in American, British, and Portuguese Gold, which according to the Act of Congress, passed February 9, 1793, is 27 grains, be the penny-weight, divide this into ten equal parts for grains—divide the grains decimally also, and call the parts Cents—Cents might be divided into Mills, but it is probable there would not be occasion for that minuteness in practice : Therefore, I shall not descend to it, but pro-

portion the several denominations according to the following Table :—*viz.*

10 Cents	- - -	1 Grain,
10 Grains	- - -	1 Pennyweight,
10 Pennyweights	-	1 Ounce,
10 Ounces	- - -	1 Pound.

Then the value of Federal, British, and Portuguese gold by weight, would stand thus in Federal Money, *viz.*

1 Cent is	- - -	1 Cent,
1 Grain	- - -	1 Dime or 10 Cents,
1 Pennyweight		1 Dollar,
1 Ounce	- - -	1 Eagle, or 10 Dolls.
1 Pound	-	10 Eagles, or 100 Dolls.

Then, after the weight of any quantity of standard Gold is ascertained and written down in figures, its value in Federal money is already found, no other reduction being needed, but only to point off all the figures below Pennyweights for the decimal parts of a dollar, and all the rest are dollars, and to be read as one whole number.—Take the following for an example.—

What is the value in Federal money, of the following weight of Federal, British, or Portuguese gold, *viz.*

*lb. Oz. dwt. gr.*

1 . 2 . 3 . 4 . 5 cents?

*Answer Dolls. 123. 45 cents.*

By such a table as this, it is plain that a child might weigh and determine the value of gold, with the utmost ease and accuracy.

FRENCH and SPANISH GOLD.

This standard being less in value by  $\frac{4}{274}$

in the Federal pennyweight, the proportions will be as follow, *viz.*

	<i>Dolls.</i>	<i>C.</i>	<i>M.</i>
1 Cent equals	0	00	9.854
1 Grain - - -	0	09	8.54
1 Pennywt. - -	0	98	5.4
1 Pound - - -	98	54	

The exchange of this gold into Federal money, may be easily performed in either of the several following methods.

1. Take the actual weight in cents multiplied by 270, and divide by 274, the quotient will be Federal money.—Or,

2. From the actual weight subtract its product, when multiplied by 146, observing to set the left hand figure of the product under the third from the left hand in the substratum or given weight.—Or,

3. From the given weight taken in grains, subtract the quotient made in dividing it by 685.

Let us take the former example to trace the operation of each of these rules.

Required the value in Federal money of  
*lb. oz. dw. gr. cents.*

1 . 2 . 3 . 4 . 5 of French or Spanish Gold.

*1st Rule.*

*lb. oz. dw. gr. cts.*

1 . 2 . 3 . 4 . 5 = 12345 Cents.

Multiply by 270

86415

24690

Cents.

Divide by 274)3333150(12164.7

or Dollars 121.64.7



*2d Rule.**lb. oz. dw. gr. cts.*1 . 2 . 3 . 4 . 5.  
Multiply by 14612345 . . . .  
1802370

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74070  
49380  
12345

---

1802370

121647630

*Dol. 121.64.8 nearly.**3d Rule.**lb. oz. dw. gr. cts.*

1 . 2 . 3 . 4 . 5. = 123.4.5 grains.

Divide by 685) 123.45( 1.8

685 D. 121.65

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5495

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5480

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15

But a more concise and convenient rule than either of the foregoing, the reader will find in the *Second Part* of the following work, where the same subject is more particularly treated and explained.

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LIQUID MEASURE.—*The Gallon unaltered.*

10 Pints make 1 Gallon

10 Gallons - 1 Federal Barrel

10 Barrels - 1 Hoghead.

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FEDERAL CLOTH MEASURE.

For the purpose of mercantile convenience, let the Yard be the only denomination used, and the parts of the yard expressed in

decimals. The yard divided into ten equal parts, and these again sub-divided into twentieths of a yard, as parts of a hundred, are as minute divisions as will ever be needed in Cloth measure. It would be convenient to make use of a measure upon the plan of the following

*Federal Yard-Stick.*



FEDERAL DRY MEASURE.

Let the Bushel according to its present standard be the unit or integer; and the only denomination used; and the parts of a Bushel, as it is now divided by pecks and gallons, be expressed in decimals of a bushel and marked upon the measures according to the following Table.—viz.

An half peck or 1 gallon	.125	} of a Bushel.
1 Peck or 2 gallons	.25	
$1\frac{1}{2}$ Peck or 3 gallons	.375	
$\frac{1}{2}$ Bushel or 4 gallons	.5	
$2\frac{1}{2}$ Pecks or 5 gallons	.625	
3 Pecks or 6 gallons	.75	
$3\frac{1}{2}$ Pecks or 7 gallons	.875	

FEDERAL APOTHECARY-WEIGHT.

*The common Grain unaltered.*

10 Grains equal 1 Scruple,

10 Scruples - 1 Dram,

10 Drams - - 1 Ounce,

10 Ounces - 1 Pound.

the common reach.—The boy is, perhaps, disgusted and discouraged, at his very outset, in travelling thro' such a thorny wild, such a dreary constellation of mixed quantities, in which he sees no particular reason nor propriety—in learning the names and uses of so many different tables—the several denominations of each, with their respective proportions; and then, as he proceeds, finding them repeated upon him in each of the first rules successively, by the operation of a variety of practical examples under each; and thus, as it were, meeting them at every corner. His memory is fatigued—his patience tried; and in short, his time and pains, and his parents' money, offered a thankless sacrifice at the shrine of arbitrary custom. At the best, he is retarded in the pursuit of real knowledge and improvement, by attending to what is intrinsically needless.

The same arguments, I think, may be applied in support of such a reform in the doctrine of weights, as in that of federal money; and similar good ends be answered by it, as in that of establishing an uniform money standard, and abolishing those absurd and idle diversities existing in pounds, shillings and pence. And, in this age of improvement, shall we stop short at the threshold, and content ourselves with but a partial reform?

The dissimilarity between us and some foreign nations, effected by such a reform, I



do not conceive would operate essentially as a clog to our commerce, any more than our actual money establishment. Our own internal convenience and happiness is to be viewed as the first object of our national policy ; and a servile compliance with the manners, usages and customs of foreign nations, the last. Our chief interest lies at home ; and foreign intercourse has been found to be an inlet of *evils* as well as *goods*. Whatever dissimilarity, therefore, may operate, in its remotest conceivable tendency or smallest degree, as a guard against the bane of foreign influence, is to be regarded as a national blessing.

I need not be reminded, that it becomes not a private individual, in a great Republic, to dictate rules and reforms of this kind : I am not so weak as to aspire to it ; but only to exercise the republican private privilege of *proposing* what the more enlightened public may judge of, and candor will not reject without reason.

In the Second Part of the following work, I have particularly attended to the rules of Reduction (commonly so called) between the several tables of mixed quantities ; and especially between each and all the various money

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NOTE. The rules of Reduction, applying to the proposed American weight, are made out, and illustrated by examples, as the substance of a distinct Lesson, in the Second Part.

currencies which run in pounds, shillings and pence, and Federal money—together with the exchange between the various foreign and federal gold coins by weight, and their value in each of the various currencies respectively ; endeavoring to fix upon the simplest mode of operation in all cases ; with a variety of examples wrought at large under each : and explanations added, where necessary, for the more easy instruction of Schools, and the benefit of young gentlemen, who may have unfortunately missed of a competent early school education.

DECIMAL PRACTICE, in which I include all operations by decimal fractions, is the title of the Third Part, and therein made the subject of a pretty extensive treatment. A variety of original rules are introduced—their reasons explained, and their use and benefit illustrated by numerous examples. I have attempted, by a series of decimal rules, to conform the whole system of commercial arithmetic to a Decimal Practice, with a view to evince the special utility of decimal fractions, in facilitating arithmetical calculations of every kind. How far I have succeeded, every one will judge for himself.

The principles of the art of BOOK-KEEPING form another division of the Third Part. This is a deviation from the usual method of most, if not all the authors who have gone before me in writing general treatises of Arithmetic. They have uniformly omitted,

altogether, that important branch of knowlege, or but slightly touched only upon some of its out-works, and minutest parts; leaving the young student, either by mercantile apprenticeship, or the dint of necessity in transacting business for himself upon the stage of life, to acquire (in the habit of any mode, however unapt, which he may happen first to embrace) the practice of the art, without ever having the knowlege of its first principles. This appears to me an error, deserving of correction; for, tho' the old adage, that *practice makes perfect*, is emphatically true in this article, yet if practice be denied the advantage of theory, the road to perfection must surely be found more difficult and uncertain. There are many branches of practical knowlege whose first principles must be learnt at school, and which, if the foundation be not well laid, by proper instruction in early life, will excite the regret, whilst they mock the wishes of riper years. The art of accomptantship appears to belong to this class; and, were it introduced as a subject of instruction, among the higher branches of Arithmetic usually taught in common schools, I am persuaded that the practice would evince its utility, by laying a foundation in the mind of the young student, for a more easy and advantageous entrance upon business, in every station in life.

BOOK-KEEPING is an art of daily use in life, and of the highest importance in all com-



mercial dealings. To be well acquainted with it, therefore, is a necessary qualification to every man of business. It enables him readily, and at any time, to ascertain the exact state of his affairs, and also easily to make an equitable, precise and honest adjustment of all his accompts with his customers. Success in business materially depends upon a thorough understanding of the art, and a strict attention to its rules. Ignorance and inattention in this article, are rocks upon which thousands have split, and made shipwreck not only of fortune, but of honesty and good conscience. Indeed, without the knowledge and practice of this art, a man's interest is ever in a blind, uncertain and hazardous situation, and that too in proportion to the variety and extent of his business.

In addition to a compendium of the Italian mode of Book-keeping agreeably to Gordon's system of accomptanship, I have proposed a new method, and called it *The Farmer's Book-keeping*—which I think may be an useful improvement to people in the common walks of life—to farmers, mechanics, and many merchants in the country, and all whose business and connections are not very extensive. It is intended to supersede the necessity of a Blotter, Day-book, or Alphabet distinct from the Ledger, and the laborious drudgery of posting books, and looking up particular names and entries in the Day-book or Journal by references in the Ledger, commonly practised in the settlement of accompts.

CLERKSHIP is so interwoven, in practice, with Book-keeping, that I have not disconnected them in theory. Clerkship, in its most extensive sense, includes Book-keeping. The latter is limited by its literal signification: the former extends to all the various written forms, and every exercise of penmanship in the draughting of *notes of hand, discharges, orders, receipts, bills, bonds, deeds, mortgages, &c.* which enter into the transaction of commercial business. I trust, therefore, it will not be expected, in a compendium of Arithmetic, that I should minutely trace a single branch, in a measure foreign from the rest, and in itself sufficiently copious for the substance of a volume; but only to sketch out the general outlines, with some particular directions, and a few of the most usual and necessary written forms of doing business in the common dealings of mankind.

Upon the subject of Book-keeping, in this place, I have only to add a single word of advice to every man in every station. *Be as careful and as faithfully exact in making entry upon your Book of every article of CREDIT, as you are in that of DEBT.*

This method will enable you, at any time, the more easily to reckon, not only with others but with *yourself*. It will also greatly tend to prevent some of the bitterest evils in life, such as vexatious lawsuits, confused and quarrelsome arbitrations, loss of property—loss of friendship and good neighborhood.

The rules of operation in computing interest is another principal object of the Third Part. There is hardly any part of Arithmetic more practical, or of more daily use; yet the subject is neither so generally nor so thoroughly understood as could be expected, or wished. It is true, that in ordinary cases, interest for a round term of time, may be ascertained with tolerable precision, by the help of printed Interest Tables; and this is a method practised by many. But it will ever be found both more convenient and more respectable for the man of business to carry his knowledge in his *head* than in his *pocket-book*. And what parent would not chuse to give his son that independence in point of education, as might place him above the necessity of applying to his School-master or Stationer for assistance, whenever he has an accompt or note of hand to be adjusted?

Without attempting to dictate any particular mode of reckoning interest upon endorsed notes and bonds, as there is a diversity of practice in this business, I have selected two particular methods, which I believe are the most generally used, and contented myself with adapting to each the best rules of operation I could devise.

1. The rule established by the Superior Court of the State of Connecticut and adopted in practice in various other parts of the Union, *viz.* To subtract each payment from the amount of principal and interest up to the



time of payment; and so taking the remainder for a new principal, make as many several casts as there are payments.

2. A mode considerably practised, and strenuously contended for by many, *viz.* to cast interest upon the whole principal for the whole time, then separately upon each endorsement for its respective time, and subtract the whole amount of the one from that of the other.

But objections are raised to each of these methods; and it is much to be wished that a greater uniformity in this point, were established. This difference, as far as it essentially operates, is disadvantageous to commerce, by placing it on uncertain ground, and hence, has been a source of litigation and lawsuits. There was, a few years since, in the state of Connecticut, an important action at law, by reviews and appeals, carried and tried through all the judicatories, from the commencing Inferior to the Supreme Court of Errors; in which action, the whole dispute arose from this difference in the mode of casting interest. The action was brought on a bond of a considerable number of years standing, having a variety of payments, of different dates, endorsed upon it. The plaintiff reckoned his interest by the former mode, and claimed £.1500 or upwards, upon the bond: the defendant reckoned the interest by the latter mode, and plead *full payment*. Judgment finally went

in favor of the defendant, upon proof made that that mode by which he reckoned, was the mode of computing interest commonly practised among merchants and men of business in the State where the plaintiff lived, and where the contract was made.

Tho' the latter mode of computing interest appears to be on the ground of simple interest strictly, and its variation from the other mode, in common cases, will not be very material; yet, the following objection, upon a little attention, will be found most clearly to lie against it, *viz.* that the interest will, in a course of years, completely expunge, or, as I may say, eat up the debt, while no part of the principal is paid.

This may need some explanation. The following example, I think, will be conclusive illustration: A. lends B. £.100, at 6 *per cent.* interest, and takes his note of hand. B. does no more than come and pay A. at every year's end £.6, and has it endorsed upon his note. At the end of ten years B. takes up his note: and what is the sum he has to pay? It is reckoned thus: The principal £.100, on interest 10 years, amounts to £.160: There are *nine* endorsements, of £.6 each, upon which the debtor claims interest; one for 9 years, the second for 8, the third for 7, and so along down: the whole aggregate amount of the several endorsements, and their interests (as any one may see, who will take the pains to reckon it) is £.70 : 0 : 2 $\frac{1}{2}$ : This sub-

tracted from £.160, the amount of the debt, principal and interest, leaves, in favor of A. the creditor, the balance of £.89:19:2½—£.10:0:9½ less than the original principal; of which he has not received the smallest fractional part, but its annual interest solely. This sum he completely loses by this mode of reckoning interest.

If the same note should lie 25 years in the same way, B. would owe but £.38:12, without paying a farthing of the £.100 borrowed. Extend it but to 23 years, and A. would fall in debt to B. £.2:1:7—The interest, like Pharaoh's lean kine, has completely eaten up the principal: Whereas, by the former mode, A. would receive, at the payment of the note, the exact sum which he was intitled to receive, viz. £.106, being the principal and its interest for the last year.

The objections against the Connecticut mode are these:

1. It is a complicated operation, and tedious in its length, where there are a great many endorsements.

*Answer.* Motives of interest are paramount to those of laziness or ignorance. A man might afford to cover a sheet with figures, and even to hire a clerk, if necessary, to assist him, in order to save ten pounds in a hundred.

2. *Objection.* It is in some cases, in a degree compound interest; that is, whenever the



principal is not diminished as much as the whole sum paid.

*Answer.* This depends intirely upon circumstances. If it be the intent of the law, or the agreement of the parties, either, or both, that the interest should be annually payable; it is not *compound* interest, but strictly simple; because the same rule also further provides, that the interest is not to be added to the principal for a substratum or minuend, where the payment is less than the interest then due.\* But,

If, by the agreement of parties, the interest be not payable under a plurality of years, then, before, it ought not to be reckoned by a plurality of periods; and whatever the debtor pays in the *interim*, would be a just deduction from the simple interest only. In this instance the Connecticut mode, (tho' it is over-ruled by the agreement of parties, and cannot apply) would be in a small degree compound interest, and in the same degree work injustice to the debtor; merely, however, by being a departure from the original contract.

As to the formidable objection, founded upon the moral distinction of *lawful* and *unlawful* interest, I would ask, what moral evil there is in a man's understandingly, and, by agreement, either giving or receiving compound interest? The crime of usury, when

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\* See the rule stated more at large, under the head of Interest, in the Third Part.

consisting not in extortion or exorbitant interest, but in exceeding a certain established rate *per cent.* is perhaps a mere creature of the law, and some of the remaining dregs of ancient superstition. It was once thought, by our pious forefathers, a great sin for a man to receive interest for the loan of money; it was, in the smallest degree of it, reprobated as *usury*. By degrees they relaxed from the severity of this sentiment. As it was found convenient and necessary, interest for money began to be allowed, and in the same degree the conviction prevailed of its being morally right and just. After the lapse of some few centuries, and several fluctuations in the *ratio* of interest, it has progressed to the state in which we find it at the present day; being, in most of the United States, established at the rate of six *per cent. per annum*. But interest upon interest is still viewed as *usurious* and wrong—and why? Perhaps for the same reason that interest upon *principal* was formerly.

If, by the most moderate calculation, by using my money myself, I might increase it at the rate of 6 *per cent. per annum*, and the amount be my capital, or principal, for the second year, and so on in the geometrical progression of compound interest, at the rate of doubling in 12 years—why should I not receive an annually-increasing benefit from the use of my money, when in the hands of another person, who is more immediately benefited by it? And if the interest for service

done, goods sold, or money lent, becomes, at the year's end, a part of the debt, and as honestly due as the principal; why should not the forbearance of that, and especially if by the *lache* of the debtor, equally intitle the creditor to *its* interest, as the further forbearance of the original principal, or as a second sum lent upon a new contract? And, upon what principles of casuistry, would it be less consistent with equity and good conscience?

And upon what reasonable ground, the use of *pecuniary* property should be restricted by *legislative* authority, whilst that of all others is left open to be regulated by contracting parties, and the existing state of commerce; I am also equally diffculted to conceive. Can there be any good reason for the one, which does not equally well apply to the other? Does not experience prove, that both the circulating quantity and current value of money, are as fluctuating as those of any other kind of property, and equally subject to the rise and fall of *market price*? A man may be as extortionous in lending other property, as in the loan of money; but is that a reason for the legislature to affix a price upon the use of my horse, and by law enact that I shall forfeit all demand, and even the horse too, if I require any more, let the circumstances of the contract be as they may? It is not uncommon for the farmer to let his sheep, and other live stock, to be returned at an hundred *per cent.* interest in four years; and such contracts are



affirmed by legal adjudications: but should he dispose of his cattle for *money*, and loan it at the same rate of interest, however benefited might be the borrower, or how great soever the risque and inconvenience of the lender, alas! it would be quite a different case—the contract would be illegal, yea usurious; and the borrower intitled to the privilege of returning the kindness of his benefactor, by defrauding him of the most equitable demand, *in due course of law*.

If the designed operation of this be to prevent one man from making another's necessity his opportunity of extortion, will it not rather operate to add insult to wretchedness, and take from necessity the opportunity of *relief*? For the monied man, if acting from no other motive than interest, would sooner put two locks upon his chest, than unlock one, to loan his money at 6 *per cent.* upon the best security given.

But it is time for me to close this subject with an apology for proceeding thus far. It is not my intention or wish, to act the part of a censor or dictator, but that of an humble individual, exercising the freedom of enquiry. In this light I wish to be viewed in the preceding observations. I undertake not to prescribe at what rate *per cent.* any one shall loan his money; but merely to assist him, by the most convenient rules, to calculate the use of it, at whatever rate he pleases—whether by the *first* or *second* mode just considered—and

whether at *simple* interest, or *compound*. If the purchaser should receive this benefit from the book, my wishes will be gratified—my pains compensated—and he will loan his money more advantageously than at *compound* interest.

BURLINGTON, (*Vermont*) }  
January 31, 1797.

I NO 61



*The American Accomptant, &c.*

P A R T I.

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L E S S O N I.

A R I T H M E T I C,

I N G E N E R A L.

Q. **W**HAT is Arithmetic ?

A. It is the art of computing by numbers, either whole or in fractions.

Q. *What is Number ?*

A. It is one or more quantities answering to the question "how many."

Q. *What is Arithmetic in whole numbers ?*

A. That which treats of intire quantities, or integral numbers, not divided into parts.

Q. *What is Arithmetic in fractions ?*

A. That which supposes its numbers to be the parts of some intire quantity or number, less than a whole.

Q. *What is the nature of all Arithmetical operations ?*

A. By some numbers or quantities that are given, to find out others before unknown.

Q. *What are the Fundamental Rules in Arithmetic ?*

A. These five, viz. Notation, Addition, Subtraction, Multiplication and Division.



## LESSON II.

## NOTATION.

Q. **W**HAT is Notation?

A. It is the art of expressing numbers, by certain characters or figures.

Q. *What is the use of Notation?*

A. Notation teaches to write and read numbers by their true value.

Q. *By how many kinds of characters are numbers expressed?*

A. By two, viz. the Arabian figures, and the Roman Letters, called Numerical Letters.

Q. *How many different characters of the Arabian figures are used in Arithmetic?*

A. Ten.

Q. *How are they formed?*

Thus

1

One.

2

Two.

3

Three.

4

Four.

5

Five.

6

Six.

7

Seven.

8

Eight.

9

Nine.

0

Nought, or Cypher.

Q. *How far may the use of these figures be extended?*

A. To express all manner of numbers, from the least, to the greatest that can be named, or conceived.

## LESSON III.

*Of the Numerical Letters.*

Q. **W**HICH are the Roman Letters used to express numbers?

A. These following, with their numbers expressed both by figures and words in the opposite columns.

Figures.	Letters.	Names.	Figures.	Letters.	Names.
1	I	One	30	XXX	Thirty
2	II	Two	40	XL	Forty
3	III	Three	50	L	Fifty
4	IV	Four	60	LX	Sixty
5	V	Five	70	LXX	Seventy
6	VI	Six	80	LXXX	Eighty
7	VII	Seven	90	XC	Ninety
8	VIII	Eight	100	C	One hundred
9	IX	Nine	200	CC	Two hundred
10	X	Ten	300	CCC	Three hundred
11	XI	Eleven	400	CCCC	Four hundred
12	XII	Twelve	500	D	Five hundred
13	XIII	Thirteen	600	DC	Six hundred
14	XIV	Fourteen	700	DCC	Seven hundred
15	XV	Fifteen	800	DCCC	Eight hundred
16	XVI	Sixteen	900	DCCCC	Nine hundred
17	XVII	Seventeen	1000	M	One thousand
18	XVIII	Eighteen	1796	MDCCXCVI	One thousand, seven hundred and ninety six.
19	XIX	Nineteen			
20	XX	Twenty			

Q. How many different letters of the Alphabet are used in expressing every number from one to the highest set down in the above Table?

A. Seven only, viz. I, V, X, L, C, D, M. These Letters may be divided into the following classes, viz. The single units, I, II, III; the Unit-Cardinal V, and its forerunner IV; 2. The Decimal-Cardinal X, with its forerunner IX; 3. The Half-Century Cardinal L, and its forerunner XL; 4. The Century Cardinal C, and its forerunner XC; 5. The Semi-millenary Cardinal D; and 6. the Millenary Cardinal M. The two last have no distinguishing forerunners.

Q. What are the Rules of Notation?

A. The forerunners are distinguished by prefixing the last letter of the foregoing number to its Cardinal, which imports that the value of the left hand letter is subtracted from that of the Right hand one—thus

IV is V less by I, or 4. IX is X less by I, or 9. XL is L less by X, or 40. XC is C less by X, or 90.

2. All the intermediate numbers between each ten and the next ten, are a repetition of the same letters in the same order—they are all annexed to the Decimal-Cardinal, and are to be read by adding their value, or number to that of the preceding number of tens—thus XVIII is X, more V, more III, or 10 and 5 and 3, which equals 18.

3. All the tens under forty, are expressed by as many X's; all the tens over 50 and below 90, by annexing to L as many X's as tens over 50.

*Lastly*, All the numbers between each hundred, are expressed by the same letters, as the numbers under the first Hundred.

*Q. To what special uses are these Numerical Letters applied?*

*A.* They are of but very little *real* use, or practical benefit—are totally unfit, or certainly the most inconvenient, for any Arithmetical calculation—The use they are applied to, is principally in typography, (besides the mill-marking of boards) to divide Verses or Chapters in Books; and seldom are used to express any higher number, than that of the year of Salvation at the bottom of the Title page.





*Q. What is the use of the foregoing Numeration Table ?*

*A. It teaches how to read any sum or number expressed in figures.*

*Q. Explain it ?*

*A. Beginning at the uppermost figure of the right hand column, which is so many single units or ones, as that figure expresses, I read it, Nine.*

*2d. Row. Two places of figures. Beginning, as before, with the right hand figure, and enumerating towards the left, according to the denominations written at the top, I say, 'units, tens : ' the left hand figure is therefore so many tens, as when standing alone, it would express single units; that is eight tens or eighty.—Accordingly I read towards the right hand and say, Eighty nine.*

*3d Row. Three places of figures. Say, 'units, tens, hundreds ; ' the left hand figure being so many hundred single units, read the whole, Seven hundred and eighty nine.*

*4th Row. Four places of figures. Say, 'units, tens, hundreds, thousands'—the last figure is so many thousand single units—read the whole, Six thousand, seven hundred and eighty nine.*

*5th Row. Five places of figures. Say, 'units, tens, hundreds, thousands, tens of thousands'—which figure is so many times ten thousand, as it expresses single units when standing alone—or fifty thousand—Read the whole number, Fifty six thousand, seven hundred and eighty nine.*

*6th Row. Six places of figures. Enumerate, 'units, tens, hundreds, thousands, tens of thousands, hundreds of thousands ; ' read, Four hundred and fifty six thousand, seven hundred and eighty nine.*

*NOTE. Let the learner commit to memory the names and numerical order of the several denominations in the Numeration Table, so that he may readily apply them to any number without the help of the Index.*

7th Row. *Seven places of figures.* You now begin to count millions—the left hand figure being next to hundreds of thousands, is so many millions, or thousands of thousands, as when standing alone it would express single units—Therefore read, *Three millions, four hundred and fifty six thousand, seven hundred and eighty nine.*

8th Row. *Eight places of figures.* The last place, or left hand figure being tens of millions, read *Twenty three million, four hundred and fifty six thousand, seven hundred and eighty nine.*

9th Row. *Nine places of figures,* which brings you, in enumerating, to hundreds of millions—read it, *One hundred and twenty three millions, four hundred and fifty six thousand, seven hundred and eighty nine.*

10th Row. *Ten places of figures,* which brings you to thousands of millions—read it, *Nine thousand, one hundred and twenty three millions, four hundred and fifty six thousand, seven hundred and eighty nine.*

11th Row. *Eleven places of figures,* amounting to tens of thousands of millions; Read, *Eighty nine thousand, one hundred and twenty three millions, four hundred and fifty six thousand, seven hundred, and eighty nine.*

12th Row. *Twelve places of figures.* The last left hand figure, standing in the place of *Hundreds of thousands of millions,* read it, *Seven hundred and eighty nine thousand, one hundred and twenty three millions, four hundred and fifty six thousand, seven hundred and eighty nine.*

## L E S S O N V.

*The same subject continued.*

**Q.** *IN what proportion do numbers increase from the units place towards the left hand?*

**A.** *In a tenfold proportion.*

**Q.** *Why is the Numeration Table made to consist of twelve places of figures, rather than ten or eleven only?*

**A.**



*A.* Because they make four even periods.

*Q.* What do you mean by a Period ?

*A.* A number expressed by three figures, of which the right hand one signifies so many units ; the second, so many tens : and the third, so many hundreds.

*Q.* Why are three figures called a period ?

*A.* Because, if the number be increased above three places, there is still the same periodical return of the value of those places, and every third figure to the left hand will always be *hundreds*, if it be ever so far extended.

*Q.* What are the figures in the Numeration Table called, in distinction from the cypher ?

*A.* They are called *significant figures* or *digits*.

*Q.* What is the use of the cypher in Notation ?

*A.* 1. When standing in units' place in connection with significant figures, it always expresses an even decimal number ; or such a number as may be divided by ten, without leaving any remainder.

2. It increases the value of its left hand significant figure tenfold—as 7 seven, 70 seventy, which is ten times 7.

*Q.* Does the Cypher have any effect upon its right hand figure ?

*A.* None at all in whole numbers—but otherwise in decimal fractions, as will be seen in its proper place.

*Q.* What is the effect where there are two, or more cyphers together ?

*A.* They increase the value of the first left hand significant figure, by a tenfold proportion, as many times as there are cyphers, thus 4, written 400, 4000 becomes four hundred—four thousand. Cyphers are also used for the same purpose, when occupying vacant denominations, between significant figures. As 4009, is four thousand, no hundreds, no tens, and nine units—or four thousand and nine.

## LESSON VI.

*Numeration farther extended.*

**Q.** *Is the expression of numbers, by figures, limited to twelve places of figures only?*

**A.** No. It may be continued and increased without end towards the left hand, in the same decimal ratio, by substituting a new collective name at every sixth place of figures from millions, instead of millions of millions, &c. Tho' there is very rarely, if ever, occasion for more than 12 places of figures in ordinary practice.

**Q.** *By what other names, besides those already mentioned in the Table, would you extend numeration beyond 12 places of figures?*

**A.** Names are but arbitrary signs of ideas, and it is pretty immaterial indeed, what names are used to express a number beyond all human conception; and where, in fact, the name conveys no adequate idea to the mind: but the names which are usually applied to every 6th place of figures from units, and their order of arrangement, are as follow, viz. Millions, Billions, Trillions, Quatrillions, Quintillions, Septillions, Octillions, Nonillions, Decillions, Undecillions, Duodecillions, &c. Each of these are millions so many times involved, as their indices, or number of remove from the place of units, counting by periods of six figures, point out. So that between either two of these, taken in the order that they stand, there is the same proportion, which there is between a million and a single unit—a million, is a single unit repeated a thousand thousand times—a billion is a thousand thousand millions, or a million of millions, and so on, according to the following

Quintil.		Quatril.		Trillions		Billions		Millions		Units.
th.	un.	th.	un.	th.	un.	th.	un.	th.	un.	th. un.
	5		4		3		2		1	
143000		750026		653912		973908		604012		763921

## L E S S O N VII.

*Examples for exercise.*

**I**T is required of you to write down, in proper figures, the following numbers ?

Nineteen.

Six hundred and forty two.

Three thousand and forty three.

Seventy six thousand, five hundred and seventy three.

Eight hundred and twenty one thousand and four.

Two millions, twenty seven thousand and nine hundred.

Ninety millions, ninety thousand and nine.

Five hundred millions, sixty seven thousand and three.

Four thousand and seventy one millions, three hundred and forty three thousand, four hundred and fifty two.

Thirty seven thousand million, eighty four thousand and eight.

One hundred and twenty thousand, four hundred and six millions, one hundred and twenty nine thousand, seven hundred and sixty three.

Now write down in words at length the following numbers :

5	734	409070	4916743	7467934857
14	1030	600978	70049048	68198186194
137	60567	5087194	195847096	700004890005



## LESSON VIII.

*Notation of mixed quantities.*

Q. **W**HAT is meant by a mixed quantity?

A. It is a quantity composed of several denominations of the same species or sort of things, of which all the lower denominations are, according to their numbers, fractional parts of the highest denomination, as Pounds, Shillings, Pence; Dollars, Cents and Mills—Tons, Hundreds, Quarters, &c. &c.

Q. How are the Tables of mixed quantities divided?

A. Into those of Money, Weight, Measure, Motion, Time, and Tale.

Q. How are the several denominations in each Table further distinguished?

A. The highest denomination may be called the ultimate or grand integer—the lowest denomination the ultimate fraction—the intervening denominations, the *mesne* integers and the *mesne* fractions, according as they respect the higher, or the lower denominations.

2. The number expressed in the highest denomination is unlimited—that of all the others is bounded—each one by the particular number of its *Terminus*.

Q. What do you mean by *Terminus*?

A. That number which in each of the lower denominations makes an unit, or one in the next higher denomination, and is therefore a bound which the number in that denomination must not equal—for instance, as twenty Shillings make one Pound—*Twenty* is therefore the *Terminus* of Shillings, and the number, in that denomination, can orderly arise no higher than 19.

Q. In what order and form are the several denominations to be placed, in expressing a mixed quantity by figures?

A. Begin by writing the highest given denomination at the left hand, placing its characteristic, either

over it, or at its left hand; then, proceeding towards the right hand, set the numbers in each denomination, in the order of the rank or value of its denomination, at a small distance apart, and separated, if it be a vulgar table, by two commas thus (,,) but if a Decimal Table, by the Decimal point or dot, thus (.) between the highest and the lower denominations.

*Q. What do you mean by a Characteristic?*

A. A certain appropriate character, or one or more letters, which represent and point out the particular denomination of any number to which it is applied.

*Q. Are these to be applied to every denomination in a given mixed quantity?*

A. It is not necessary to express any other characteristic, than that of the highest denomination in the given quantity; unless for the greater ease of the young beginner, and until he is become well versed in the order of the denominations.

*Q. What if there be a vacant denomination in the given quantity, as seven pounds, and seven pence?*

A. Fill up the vacant denomination with as many Cyphers, as it will admit of significant figures; as £7,00,7.

*Q. What do you mean by a Vulgar Table, and a Decimal Table?*

A. A Decimal Table of mixed quantities, has the terminus of each denomination a decimal number, such as ten, hundred, &c. A Vulgar Table is that which has any other number as Terminus.

## L E S S O N IX.

The Tables of Money—different currencies—standard value of Gold—names and value of foreign and Federal coins.

*The Vulgar Table of Money.*

*Characteristics.*

4 Farthings (q) make	1 Penny.	d
12 Pence	1 Shilling.	s
20 Shillings	1 Pound.	£

*Q. Are there not several currencies in this Table, which differ in their value?*

*A. Yes, there is,*

1. Sterling money, which is the money of account in England.

2. Irish money—used in Ireland.

3. Halifax money—the currency of Nova Scotia and the two provinces of Canada.

4. South Carolina and Georgia currency.

5. The currency of New-Hampshire, Massachusetts, Connecticut, Rhode-Island, Virginia, Vermont and Kentucky, commonly called the Lawful Money of New-England.

6. New-Jersey, Pennsylvania, Delaware and Maryland currency.

7. New-York and North-Carolina currency.

*Q. What are the proportionate values of these different currencies?*

*A. They may be seen by the following tables, valuing 1 Pound of each currency in Federal money, and 1 Dollar of Federal money in those several currencies.*

<i>One Pound,</i>	<i>Dollars.</i>	
1. Sterl. money =	4.44 4	<div> One Dollar Federal money, is </div> <div> { 4s6 Sterl.  4s10½ Irish.  5s0 Halifax.  4s8 S.C. &amp;c.  6s0 N.H. &amp;c.  7s6 N.J. &amp;c.  8s0 N.Y. &amp;c. } </div>
2. Irish do. =	4.10 3	
3. Halifax do. =	4.00 0	
4. S.C. &c. do. =	4.28 7	
5. N.H. &c. do. =	3.33 3	
6. N. J. &c. do. =	2.66 6	
7. N.Y. &c. do. =	2.50 0	

But all the above different currencies that are used in the United States, are giving way to one uniform currency of the Federal Money.



## NOTATION.

*Of Federal Money.**Characteristics.*

10 Mills (/) make 1 Cent.	//
10 Cents - - - 1 Dime.	⌘
10 Dimes - - - 1 Dollar.	⌘
10 Dollars - - - 1 Eagle.*	E.

*Q. What are the names of the several foreign and federal gold, silver and copper coins, circulating in the United States, and their value in Federal Money?*

*A.**Gold Coins.*

<i>Foreign.</i>	{	A Double Johannes is	16.00 0
		A Single ditto, - -	8.00 0
		An English Guinea, -	4.66 7
		A Half ditto, - -	2.33 3
		A French Guinea, -	4.59 8
		A half ditto, - - -	2.29 9
		4 Pistoles, - - -	14.45 2
		2 Pistoles, - - -	7.22 6
		1 Pistole, - - -	3.61 3
<i>Federal.</i>	{	A Moidore, - -	6.05 8
		An Eagle, - - -	10.00 0
		A Half ditto, - - -	5.00 0
		A Quarter ditto, - -	2.50 0

*Silver Coins.*

A French Crown is	1.10
A Half ditto, - -	0.55
A Pistareen, - - -	0.20
A Half ditto, - -	0.10
Spanish & Federal Dol.	1.00
Its parts are in proportion.	

---

\* The Eagle is the largest Gold Coin of the UNITED STATES. Dimes are annexed to Cents, and only the

*Copper Coins.*

The Cent, one hundredth part of a Dollar.

Half Cent, or five Mills.

*Q. At what rate, according to their present standard, are the Gold coins of Great Britain, Portugal, France and Spain, made a lawful tender in the United States, by act of Congress?*

*A.* Those of Great Britain and Portugal, at the rate of 100 Cents, or 1 Dollar for every 27 grains actual weight; Those of France and Spain at 27 grains and two fifths of a grain actual weight.

*Q. What is the standard of all gold coins of the United States?*

*A.* Eleven parts fine, or pure gold, to one part of alloy; so that, eleven parts in twelve of the entire weight of the said coins must consist of pure gold, and the remaining one twelfth part of alloy.

*Q. Of what is the alloy composed?*

*A.* Of silver and copper—not exceeding one half silver.

*Q. What is the proportionate value of gold to silver in all coins current in the United States?*

*A.* It is as fifteen to one, according to quantity in weight of pure gold, or pure silver; that is to say, every fifteen pound weight of pure silver is, by act of Congress, to be of equal value, in all payments, with one pound weight in pure gold; and so in proportion.

*Q. What is the standard for all silver coins of the United States?*

*A.* One thousand, four hundred and eighty parts fine, to one hundred and seventy-nine parts alloy; and the alloy must be wholly of copper.

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*denominations of Dollars, Cents and Mills expressed, in reckoning Federal money: the Dollar being the money unit. For the names and values of foreign coins, see the Rules of Exchange, in the Second Part.*

## LESSON X.

*The mixed quantities of Weight, Measure, &c.*

## VULGAR TROY-WEIGHT.

		<i>Characteristics,</i>
24 Grains (gr.) make	1 Pennyweight.	<i>dwt.</i>
20 Pennyweights -	1 Ounce.	<i>oz.</i>
12 Ounces - - -	1 Pound.	<i>lb.</i>

Q. **W**HAT things are weighed by this weight?  
 A. Gold, silver, jewels, electuaries, and all liquors.

## FEDERAL TROY-WEIGHT.\*

10 Cents (ct.) make	1 Grain.
10 Grains - - -	1 Pennyweight.
10 Pennyweights -	1 Ounce.
10 Ounces - - -	1 Pound.

See this Table more particularly explained in the Introduction, page 10.

## VULGAR AVOIRDUPOIS-WEIGHT.†

		<i>Characteristics,</i>
16 Drams (dr.) make	1 Ounce.	<i>oz.</i>
16 Ounces - - -	1 Pound.	<i>lb.</i>
28 Pounds - - -	1 Quarter Hund.	<i>qr.</i>
4 Quarters - - -	1 Hundred wt.	<i>cwt.</i>
20 Hundred wt. -	1 Ton.	<i>T.</i>

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\* The new-proposed Federal Tables, tho' already recited in the Introduction, are re-inserted in this Lesson, for the sake of orderly arrangement.

† By Avoirdupois are weighed all coarse and dry goods, grocery and chandlery wares, bread, and all metals excepting gold and silver.



## FEDERAL AVOIRDUPOIS-WEIGHT.

10 Drams ( <i>dr.</i> )	make	1 Ounce.	<i>oz.</i>
10 Ounces	- - -	1 Pound.	<i>lb.</i>
100 Pounds	- - -	1 Hundred wt.	<i>cwt.</i>
10 Hundreds	- - -	1 Thousand do.	<i>mw.</i>

See the Introduction, page 10.

## APOTHECARY-WEIGHT.\* (*Vulgar Table.*)

20 Grains ( <i>gr.</i> )	make	1 Scruple.	$\mathfrak{z}$
3 Scruples	- - -	1 Dram.	$\mathfrak{z}$
8 Drams	- - -	1 Ounce.	$\mathfrak{z}$
12 Ounces	- - -	1 Pound.	<i>lb.</i>

## FEDERAL APOTHECARY-WEIGHT.

10 Grains equal	1 Scruple.	} <i>Characteristics the same as in the Vulgar Table.</i>
10 Scruples	- - 1 Dram.	
10 Drams	- - 1 Ounce.	
10 Ounces	- - 1 Pound.	

## LONG MEASURE.†

3 Barley-Corns ( <i>b. c.</i> )	make	1 Inch.	<i>in.</i>
4 Inches	- - - - -	1 Hand.	<i>hd.</i>
12 Inches	- - - - -	1 Foot.	<i>ft.</i>
3 Feet	- - - - -	1 Yard.	<i>yd.</i>
6 Feet	- - - - -	1 Fathom.	<i>fa.</i>
5 Yards and a half	- - -	1 Rod, Pole or Perch.	<i>po.</i>
40 Rods, or 220 Yards,	- - -	1 Furlong.	<i>fu.</i>
8 Furlongs, or 1760 Yards,	- - -	1 Mile.	<i>m.</i>
3 Miles	- - - - -	1 League.	<i>l.</i>
60 Miles	- - - - -	1 Degree.	<i>deg.</i>

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\* *All the weights now used by Apothecaries, above grains, are Avoirdupois.*

† *The use of Long Measure is to measure the distance of places, or any other thing, where length is considered, without regard to breadth.*

## NOTATION.

## FEDERAL BOARD MEASURE.

10 Pepper-Corns ( <i>pc.</i> )	make	1 Federal Inch.	<i>in.</i>
10 Federal Inches	- - -	1 Common Foot.	<i>ft.</i>
10 Square Feet	- - -	1 Pannel.	<i>p.</i>
10 Pannels	- - -	1 Gang.	<i>g.</i>
10 Gangs	- - -	1 Thousand Feet.	<i>td.</i>

CLOTH MEASURE. (*Vulgar Table.*)

2 Inches and a Quarter	make	1 Nail.	Marked <i>na.</i>
4 Nails	- - -	1 Q <sup>r</sup> . of a Yd.	<i>qr.</i>
4 Quarters, or 36 Inches	-	1 Yard.	<i>yd.</i>
3 Quarters of a Yard	-	1 Flemish Ell.	<i>Fl.</i>
5 Quarters of a Yard	- -	1 English Ell.	<i>Eng.</i>

See the above Table *federalized*, in the *Introduction*, page 21.

## LAND MEASURE.

9 Square Feet	make	1 Yard.	Marked <i>y.</i>
30 Yards & a Quarter	1 Pole.	- -	<i>po.</i>
40 Square Poles	-	1 Rood.	<i>r.</i>
4 Roods, or 160 Poles	1 Acre.	- -	<i>a.</i>

LIQUID MEASURE. (*Vulgar Table.*)\*

4 Gills ( <i>j.</i> )	make	1 Pint.	Marked <i>pt.</i>
2 Pints	- - -	1 Quart.	<i>qt.</i>
4 Quarts	- -	1 Gallon.	<i>gal.</i>
3 1/2 Gallons	- -	1 Barrel.	<i>bar.</i>
42 Gallons	- -	1 Tierce.	<i>t.</i>
63 Gallons	- -	1 Hogshead.	<i>hhd.</i>
84 Gallons	- -	1 Puncheon.	<i>pu.</i>
2 Hogsheads	- -	1 Pipe, or Butt.	<i>p.</i>
2 Pipes, or 4 Hogsheads,	1 Tun.	-	<i>tu.</i>

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\* All Brandies, Spirits, Perry, Cyder, Mead, Vinegar and Oil, are measured by this measure, which is usually called Wine-measure.

# NOTATION.

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## LIQUID MEASURE. (*Federal Table.*)

10 Federal Pints (*pt.*) make 1 Common Gallon. *gal.*  
 10 Common Gallons - - - 1 Federal Barrel. *f. b.*  
 10 Barrels - - - 1 do. Hogshead. *hhd.*

## DRY MEASURE.

2 Pints (*pt.*) make 1 Quart. Marked *qt.*  
 4 Quarts - - - 1 Gallon. - - *gal.*  
 2 Gallons or 8 Qts. 1 Peck. - - *p.*  
 4 Pecks - - - 1 Bushel of the U. S. *u. b.*  
 5 Pecks or 40 Qts. 1 Canada Bushel. - *c. b.*  
 See this Table *federalized*, page 25, *Introduction.*

## T I M E.

60 Seconds (*sec.*) make 1 Minute. Marked *min.*  
 60 Minutes - - - 1 Hour. - - *hr.*  
 24 Hours - - - 1 Day. - - *da.*  
 7 Days - - - 1 Week - - *wk.*  
 4 Weeks - - - 1 Month - - *mo.*  
 13 Months, 1 Day } 1 { Common or Ju-  
                     and 6 Hours }    { lian Year. - *yr.*  
 Q. What is a Solar Year?  
 A. 365 days, 5 hours, 48 minutes and 55 seconds.  
 Q. How is the year divided by the Calendar?  
 A. Into 12 months, each containing the number of  
 days which follow, *viz.*

September	} 30	October	} 31
April		December	
June		January	
November		March, May,	
		July and August	

February hath but 28 days, excepting the addition  
 of 1 day in every fourth year; which year is called  
*Bissexile*, or *Leap Year*.\*

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\* The Anno Domini which may be divided by four,  
 without any remainder, is *Bissexile*, or *Leap Year*.



*MOTION, (in the Heavenly Bodies.)*

60 Seconds (*//*) make 1 Minute. Marked *l*.  
 60 Minutes - - - 1 Degree. - - - *o*.  
 30 Degrees - - - 1 Sign.  
 12 Signs, or 360 Degrees, make the whole great  
 Circle of the Zodiac.

*Of things accounted by the Tale.*

12 Particulars (*p.*) make 1 Dozen. Marked *doz*.  
 12 Dozen - - - 1 Gross. - - - *gr*.  
 12 Gross, or 144 Dozen 1 Great Gross. *g. gr*.

*Federalized.*

10 Particulars (*p.*) make 1 Desm. Marked *dm*.  
 10 Desms - - - 1 Gross. - - - *gr*.  
 10 Gross, or 100 Desms - 1 Great Gross. - *g. gr*.

## L E S S O N X I.

*Explanation of sundry Marks and signs used in this  
 Compendium.*


**T**WO horizontal parallel lines are the sign of  
 equality; as  $\text{§} 1 = \text{§} 10 = // 100 = / 1000$ ; *i. e.* 1 dollar  
 equals 10 dimes, which equals 100 cents, which equals  
 1000 mills.

**+** A rectangular cross is the sign of Addition; as  
 $10 + 7 + 5 = 22$ ; *i. e.* 10 and 7 and 5, added toge-  
 ther, equal 22.

**{** The perpendicular brace, placed at the left or  
 right hand of two or more simple or mixed quantities,  
 combines them together, and signifies that their aggre-  
 gate, or sum total, is to be taken—thus:

$$\left\{ \begin{array}{r} 153 \\ 416 \\ 738 \end{array} \right.$$

This is more especially used in the compound rules, hereafter explained.

 The horizontal brace. This connects all the numbers over which it is placed, and signifies that that number is to be taken, which is produced from one or more operations of those numbers, agreeably to the signs with which they are connected—thus :

$$\overbrace{15+12}$$

is the same as 27 ; and, by the brace, are lequestered from any preceding or following numbers. This sign is more especially used in Proportion.

— A strait line, or dash, is the sign of Subtraction. It may be placed between any two or more single or aggregate numbers which are set down either horizontally or perpendicularly ; as  $25-12$ , or  $\frac{25}{2}$ , signify, in the first case, that the right hand number is to be taken from the left ; and in the second, that the lower number is to be subtracted from the upper.

× The oblique cross, or ecks, is the sign of Multiplication. This may be placed between numbers set down either horizontally or perpendicularly ; as  $25 \times 5 = 125$ , or

$$\begin{array}{r} \times 5 \\ 125 \end{array}$$

÷ & } Are signs of Division. The former is used ) ( } in compendious statements ; the latter, or inverted parentheses, in formal operations, where the example is to be wrought at large. Thus  $125 \div 5$  expresses the Quotient of 125, divided by 5 ; but  $5)125$  directs to the formal operation of Division.

∴ & :: Are the signs of proportion : the first ( ∴ ) separates the first and second terms, and the third and fourth ; the second ( :: ) separates the second and third terms : The first may be read by the words *is to* ; the second by the words *so is* : thus,  $3 \therefore 5 :: 6 \therefore 10$  ; that is, as 3 is to 5, so is 6 to 10.

— A single line between two lines, is used to divide the statement from the work, and also the seve-

ral steps of the operation into its proper divisions or parts.

( ) Is a sign, when used in explanations, to signify that the figure or figures, inclosed by it, are actually set down in the work. When it incloses a figure or figures, in ending the operation of division, thus,  $224)448(2$ , it shews what remainder there is.

$$\begin{array}{r} 448 \\ \hline \end{array}$$

$$(0)$$

**X** The capital *ecks*, used in proving operations in Multiplication and Division, as will be explained in its proper place.

==== The double line, drawn under a row of figures, shews that the operation is finished, and the answer stands over it.

*Note. The Decimal Signs will be explained, under that branch of Arithmetic.*

## L E S S O N XII.

### ADDITION, IN GENERAL.

**Q. W**HAT is the use of Addition?

*A.* It teaches to bring several particular numbers, either of one or more denominations, into one total sum.

*Q.* What is the aggregate quantity called?

*A.* The sum total.

*Q.* How is Addition divided?

*A.* Into Simple and Combined; and each of these subdivided into that of whole numbers and mixed quantities.

*Q.* What is the general rule of setting down several numbers or quantities, so as to prepare them for the work of Addition?



*A.* It is indifferent which number you set down first; but observe to place all the figures of the same value or denomination in a perpendicular line; that is to say, place units under units, tens under tens, &c. pounds under pounds, shillings under shillings, &c. dollars under dollars, cents under cents, &c.

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# L E S S O N XIII.

## ADDITION OF WHOLE NUMBERS.

**Q.** *W* *HAT is the rule of operation?*

*A.* After the numbers are set down, as directed in the former Lesson, begin at the unit figure of the lowermost number, and add it to all the figures standing directly above it.

*Q.* *What is the next step?*

*A.* 1. Set down the amount of those unit figures directly under them, having first drawn a line of separation under the statement.

2. If the amount of the figures added exceed *ten*, then set down only its number of complete tens, and add *one*, for every of those tens, to the next left hand column; but if the sum of a right hand column be any number of exact *tens*, in that case set down a cypher in the sum total, and carry for the tens to the next column as before.

3. Continue this operation thro' all the columns, observing to set down the whole amount of the left hand column, which will complete the operation.

*Q.* *What is the reason of this rule of carrying one for every ten, to the next place of figures?*

*A.* It springs from the principle of the Numeration Table, and the decimal ratio of increase in the rising scale, which is from right hand to left, in all the denominations or places of figures expressing whole numbers: *ten* in the units' place make *one* in the

*tens'* place; and ten *tens* make *one* in the place of *hundreds*; and so on.

Q. How is the work of Addition proved?

A. By adding the figures downwards, and finding the same sum total.

## ADDITION TABLE.

1									
2	2								
3	4	3							
4	5	6	4						
5	6	7	8	5					
6	7	8	9	10	6				
7	8	9	10	11	12	7			
8	9	10	11	12	13	14	8		
9	10	11	12	13	14	15	16	9	
10	11	12	13	14	15	16	17	18	

Q. How is this Table to be read?

A. By the figures standing upon the steps ; each of which added to itself is, the number standing the next under it ; and if you would add any two different numbers upon the steps, note the number standing the next under that check where their perpendicular and horizontal rows meet, and that is their sum ; for instance, in adding 8 and 4, the number standing the next under their common angle of meeting is 12.

EXAMPLES.\*

3	34	456	5607	82596
4	45	£23	6391	97403
<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>
7	79	979	11998	179999
<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>	<u>  </u>

\* Let the learner be accustomed in each Example to read correctly each number expressed in the statement before he performs the addition ; and afterwards the sum total.

<i>Dollars.</i>	<i>Yards.</i>	<i>Pounds.</i>
4734736	46431734	347312484
3474313	72261374	268126312
4161321	12612714	718126190
7369133	31371262	731618192
3143618	74147312	312134716
4732216	47312641	171216193
<hr/>	<hr/>	<hr/>
27615341		
<hr/>	<hr/>	<hr/>

*Explanation of the last sum wrought.*

Beginning with the unit figure of the lowermost number, I say 6 and 8 is 14 and 8 is 22 and 1 is 23 and 2 is 25 and 6 is 31 : I therefore set down 1 directly under the column, and for the thirty carry 3 to the next column : the *second* column by adding 1 find to amount to 14—I set down 4 and carry 1—the *third* column amounts to 23—I set down 3 and carry 2; the *fourth* column amounts to 25, here I set down 5 and carry 2; the *fifth* column amounts to 31, set down 1 and carry 3; the *sixth* column amounts to 26, set down 6 and carry 2; the *last* column amounts to 27, I set down the whole, and find the sum total to be *twenty seven millions, six hundred and fifteen thousand, three hundred and forty one dollars.*

Received of several persons the following sums of Money; what is the total sum received, viz.

Of A.	3575
B.	1846
C.	297
D.	2954
E.	1328
	<hr/>
	<hr/>

*Note. The Instructor may, both in this and the following Rules, add as many practical examples, as he judges necessary for the exercise of his student.*



## LESSON XIV.

*Addition of Federal Money, and of the other Federal Tables.*

Q. **W**HAT is the Rule of Operation ?

A. Just the same as that in addition of whole numbers; observing only to place the separating point between the several denominations.

## EXAMPLES.

## FEDERAL MONEY.

1	2	3
$  \begin{array}{r}  \$17.35\ 5 \\  15.21\ 3 \\  19.19\ 6 \\  12.12\ 2 \\  9.65\ 8 \\  24.33\ 3 \\  \hline  97.87\ 7 \\  \hline\hline  \end{array}  $	$  \begin{array}{r}  \$175.75\ 0 \\  241.39\ 4 \\  142.93\ 5 \\  87.00\ 9 \\  325.55\ 2 \\  532.44\ 4 \\  \hline  \hline\hline  \end{array}  $	$  \begin{array}{r}  \$571.57\ 4 \\  142.98\ 0 \\  78.00\ 6 \\  241.39\ 1 \\  523.65\ 9 \\  235.66\ 6 \\  \hline  \hline\hline  \end{array}  $

*Explanation of the first example, which will virtually explain the operation of the others, and of all the examples in each of the Federal tables following.*

Say 3 and 8 is 11, and 2 is 13, and 6 is 19, and 3 is 22, and 5 is 27; set down 7 and carry 2. Next, 2 I carry to 3 is 5, and 5 is 10, and 2 is 12 and 9 is 21, and 1 is 22, and 5 is 27, (7) and carry 2; next 2 I carry to 3 is 5, and 6 is 11, and 1 is 12, and 1 is 13, and 2 is 15, and 3 is 18; set down 8, and carry 1; next 1 I carry to 4 is 5, and 9 is 14 and 2 is 16 and 9 is 25 and 5 is 30, and 7 is 37, set down 7, and carry 3. Lastly, 3 I carry to 2 is 5, and 1 is 6, 1 is 7, 1 is 8, 1 is 9; which, set down, completes the operation, and makes the sum total ninety seven dollars, eighty seven cents, and seven mills.

# FEDERAL MONEY, &c. 69

## A MERCHANT'S BILL.

*Bought of Anthony Brotherton, Dec. 18, 1796.*

9 yards of Silk at	2.33	-	-	20.97
14 ditto Broad cloth at	4.50	-	-	63.00
9 ditto Holland at	75	-	-	6.75
10 ditto Shalloon at	55	-	-	5.50

## FEDERAL TROY WEIGHT.

1	2	3
lb.oz.dw.gr.	lb.oz.dw.gr.	lb.oz.dw.gr.
19.7 5 6	44.8 3 2	325.9 8.7
21.6 5 7	32.6 9 4	436.8 7 6
34.8 3 9	57.7 6 5	547.7 6 5
45.3 9 8	84.5 4 1	658.6 5 4

## FEDERAL AVOIRDUPOIS WEIGHT.

1	2	3
mwot.c.lb.oz.		mwot.c.lb.oz.dr.
33.5 64 8		754.6 78 9 0
48.7 57 7		643.5 67 8 9
27.6 28 8		532.4 56 7 8
54.9 61 2		421.3 45 6 7

## APOTHECARY WEIGHT.

1	2
lb.ʒ.ʒ.ʒ.gr.	lb.ʒ.ʒ.ʒ.gr.
4.6 7 7 3	17.7 7 7 7
5.8 6 5 4	16.6 6 6 6
6.4 5 6 8	15.5 5 5 5
7.3 4 8 2	14.4 4 4 4

Note. The other Federal Tables are upon the same principle.

SUBTRACTION OF  
LESSON XV.  
SUBTRACTION  
*Of Whole Numbers.*

**Q.** **W**HAT is the nature and use of Subtraction?

**A.** It takes a less number from a greater, and shews the difference between them.

**Q.** What are the parts of Subtraction?

**A.** 1. The larger number from which the subtraction is to be made, called the Substratum.

2. The Subtrahend, or smaller number, to be taken out of the Substratum.

3. The Remainder, or the difference found after the work is performed.

**Q.** How are the numbers to be set down, to prepare them for the work of Subtraction?

**A.** In the same manner as in Addition, observing only to place the Substratum, or larger number, the uppermost.

**Q.** What is the rule of operation?

**A.** Draw a line under the Subtrahend, and then, beginning at the right hand, subtract the value of each figure in the lower number, from that of the one standing directly above it, setting down the difference in a third row, directly under it, for the Remainder.

**Q.** What if the upper figure be a larger number than the lower one?

**A.** 1. In that case you will subtract the lower number from the upper, made larger by ten. If, for example, you have to take 7 from 6, say 7 from 16, and set down the difference between those two numbers.

2. Read the next left hand figure 1 less in the operation than what it stands for in the numeration; and if it be a cypher, read it 9; and if there be two or more cyphers standing together, read them all nines, and the first left hand significant figure 1 less than what it stands for.



*Q. What is the reason of this Rule?*

*A.* It is because your annexing a left hand unit figure, or adding 10 to the smaller Substratum figure, is borrowing or taking away 1 from its next left hand figure, which leaves it one the less; and in case of one or more cyphers, as they make their left hand significant figure a decimal number, taking away 1, reduces the first significant figure 1 less than its nominal value, and places the cyphers, be there ever so many intervening, at 1 less than a decimal number, which is 9; thus, take 1 from 500, will leave 499.

*Q. Is there not another method of performing Subtraction?*

*A.* Yes: the common method is, in the case above, to borrow ten from which to subtract, and to the difference add the upper number, carrying 1 to the next Subtrahend figure; but this is only a circuitous way of adding ten to the upper figure in the first instance.

*Q. How do you prove the operation of this Rule?*

*A.* By adding the Remainder to the Subtrahend, and finding it equal the Substratum.

EXAMPLES.

	1	2	3
From	8645	75679	978675
Take	6543	54362	976330
	<u>2102</u>	<u>          </u>	<u>          </u>
	<u>      </u>	<u>      </u>	<u>      </u>
	4	5	6
From	654006	8492653	73165841
Take	584567	4738062	56341792
	<u>69439</u>	<u>          </u>	<u>          </u>
	<u>      </u>	<u>      </u>	<u>      </u>

*Explanation of the Example last wrought.*

Beginning at the right hand, I say 7 from 16 leaves 9: this assumption changes the three next left hand

figures, 400, into 399; therefore I go on with the next figures in the Subtrahend, and say 6 from 9 leaves 3; 5 from 9, 4; 4 from 13, 9; 8 from 14, 6; 5 from 5, 0; and the subtraction is completed—leaving for a remainder, sixty-nine thousand, four hundred and thirty-nine.

## L E S S O N XVI.

### *Subtraction of Federal Money, and the other Federal Tables.*

#### 1. MONEY.

**Q** *How do you subtract Federal Money?*

*A.* The rule of operation and of proof, in this and all the other Federal Tables following, is precisely the same as that of whole numbers, observing only to keep the denominations distinct by the separating Points.

	1	2	3
	¢ ¢ ¢	¢ ¢ ¢	¢ ¢ ¢
From	17.35 5	175.75 0	571.67 4
Take	15.21 3	142.95 5	523.65 9
	<u>          </u>	<u>          </u>	<u>          </u>
Rem.	2.14 2		
	<u>=====</u>	<u>=====</u>	<u>=====</u>
	4	5	6
	¢ ¢ ¢	¢ ¢ ¢	¢ ¢ ¢
Borr.	43.6 4 3	59.7 4	48.3 3 3
Paid	37.9 3 7	43.8 3	22.6 6 6
	<u>          </u>	<u>          </u>	<u>          </u>
Due			
	<u>=====</u>	<u>=====</u>	<u>=====</u>

	7	8
	£ // /	£ // /
Received	728.56 3	8765.89 3
Paid out	628.56 4	957.75 8
	<hr/>	<hr/>
	£	£
	<hr/>	<hr/>

I lent my friend £525.50 0  
 Received in part pay 270.16 6  
 What is the balance due me ?

9  
 £  


---


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TROY-WEIGHT.

1	2	3
lb. oz. dw. gr.	lb. oz. dw. gr.	lb. oz. dw. gr.
45.3 9 8	84.5 4 1	658.6 5 4
34.8 3 9	32.6 9 4	325.6 9 7
<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>

AVOIRDUPOIS WEIGHT.

1	2	3
mw. c. lb. oz.	mw. c. lb. oz.	mw. c. lb. oz. dr.
54.9 61 2	48.7 57 7	754.3 45 6 7
33.5 64 3	27.6 28 8	421.6 78 9 0
<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>

APOTHECARY WEIGHT.

1	2
℥ 33 ℥ gr.	℥ 33 ℥ gr.
7.3 4 8 2	17.4 4 4 4
4.6 7 7 3	14.7 7 7 7
<hr/>	<hr/>
<hr/>	<hr/>



## ADDITION AND

## BOARD MEASURE.

1	2
<i>td. g. pan. ft.</i>	<i>td. g. pan. ft. in. pc.</i>
5.8 9 2	86.1 4 7 3 2
2.5 6 4	48.9 6 8 5 4
<u>          </u>	<u>          </u>
<u>=====</u>	<u>=====</u>

## CLOTH MEASURE.

1	2	3
<i>yds. dec. pts.</i>	<i>yds. dec. pts.</i>	<i>yds. dec. pts.</i>
42.25	72.85	340.25
19.7	17.35	172.35
<u>          </u>	<u>          </u>	<u>          </u>
<u>=====</u>	<u>=====</u>	<u>=====</u>

## LIQUID MEASURE.

<i>hhds. b. gal. pts.</i>	<i>hhds. b. gal. pts.</i>
7.3 7 5	64.4 3 1
5.6 4 3	35.4 6 9
<u>          </u>	<u>          </u>
<u>=====</u>	<u>=====</u>

## DRY MEASURE.

<i>Bu. dec. pts.</i>	<i>b. dec. pts.</i>
8. 115	65. 625
5. 875	48. 845
<u>          </u>	<u>          </u>
<u>=====</u>	<u>=====</u>

## L E S S O N XVII.

ADDITION and SUBTRACTION combined.

Q. **W**HAT is the nature and effect of this Rule?

A. It is finding the difference between two quantities, whereof either one or both are aggregate num.

bers, by the operation of Addition and Subtraction compounded in one process, instead of several distinct processes by those Rules.

*Q. What do you mean, in this place, by an Aggregate number?*

*A.* It is the whole amount of several numbers expressed in the statement, whose sum total is not to be set down in the operation.

*Q. How do you prepare the numbers for the work?*

1. Set them down as in Addition and Subtraction, units under units, &c. &c. the Substratum the uppermost.

2. Place the sign of Subtraction between the numbers, and distinguish the aggregate by extending the perpendicular brace to each of the particular numbers of which it is composed.

CASE I.

*Q. Where the Substratum is a single number, and the Subtrahend an aggregate, what is the rule of operation?*

*A.* 1. Add the right hand column of the aggregate, and subtract the unit figure of its sum from the figure above it in the Substratum.

2. If you have to borrow ten in the subtraction, add that to the number of tens you have to carry in addition.

*Q. How is the work proved?*

*A.* By adding up the several numbers of the aggregate, setting down their sum total, and subtracting it from the upper number.

EXAMPLES.

$$\begin{array}{r}
 \text{From} \quad 98762 \\
 \text{Take} \quad \left\{ \begin{array}{l} 7654 \\ 3842 \\ 763 \end{array} \right. \\
 \hline
 \text{Remains} \quad 81503 \\
 \hline \hline
 \end{array}$$

*Explanation.*

Say 3 and 2 is 5, and 4 is 9 ; 9 from 12 (viz. 2 with the addition of 10 borrowed) leaves 3 :—

Next, 1 that I borrowed, to 6, makes 7, and 4 is 11, and 5 is 16 ; 6 from 6 leaves 0.

Next, 1 that I carry (for the 10 in addition) to 7 is 8, and 8 is 16, and 6 is 22 ; 2 from 7 leaves 5, which also set down.

Next, 2 that I carry to 5 is 7, and 3 is 10 and 7 is 17 ; 7 from 8 leaves 1.

Lastly, 1 from 9 leaves 8.

Borrowed  $\text{£}2546.66\ 6$  <sup>2.</sup> Lent  $\text{£}2668.40\ 3$

Paid at several times.	{	43.51 3	Received at several times	{	41.86 3
		57.32 9			65.41 3
		53.59 0			58.36 3
		70.34 6			48.51 2
		65.30 0			65.36 0
		88.93 3			48.61 6
		39.92 0			57.69 6
		45.60 3			12.21 0

Unpaid.

Remains due.

The general rule of operation is the same in the two last examples as in the two former.

These examples are judged sufficient to be inserted in this place. The Instructor or Practitioner can at his pleasure extend them to all the other tables of mixed quantities, the same general rule of operation applying to them all.

### CASE 2.

*Where the Substratum is an aggregate and the Subtrahend a single number.*

*Rule.* Make the subtraction from the sum of each column in the aggregate, setting down the unit figure of the remainder, and adding the figure in the tens' place, to the next column of the aggregate, and if



# SUBTRACTION COMBINED. 77

there ever be occasion to borrow 10 in the subtraction, take 1 from the number of tens to be carried in the next addition or from the sum of the next column.

The work may be proved by comparing the sum total of the aggregate set down, with that of the Subtrahend and Remainder.

## EXAMPLES.

1.

$\begin{array}{r} 96857 \\ 75869 \\ 43541 \\ \hline 87543 \\ \hline \text{Rem. } 128724 \\ \hline \hline \end{array}$	<p><i>Explanation.</i></p> <p><math>1+9+7=17-3=14(4); 1+4+6+5=16-4=12(2); 1+5+8+8=22-5=17(7); 1+3+5+6=15-7=8(1); 4+7+9=20-8=12(12)</math></p>
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<p style="text-align: center;">2.</p> <table border="0"> <tr> <td style="vertical-align: middle;">Lent to B. at several times</td> <td style="vertical-align: middle; font-size: 3em;">{</td> <td style="vertical-align: middle;"> <math display="block">\begin{array}{r} \text{\textcircled{X}} 35.45\ 0 \\ 53.54\ 5 \\ 28.75\ 6 \\ 47.63\ 8 \\ \hline \text{Received } 99.90\ 0 \\ \hline \text{Remains due} \\ \hline \hline \end{array}</math> </td> </tr> </table>	Lent to B. at several times	{	$\begin{array}{r} \text{\textcircled{X}} 35.45\ 0 \\ 53.54\ 5 \\ 28.75\ 6 \\ 47.63\ 8 \\ \hline \text{Received } 99.90\ 0 \\ \hline \text{Remains due} \\ \hline \hline \end{array}$	<p style="text-align: center;">3.</p> <table border="0"> <tr> <td style="vertical-align: middle;">Borrowed of W. at several times.</td> <td style="vertical-align: middle; font-size: 3em;">{</td> <td style="vertical-align: middle;"> <math display="block">\begin{array}{r} \text{\textcircled{X}} 152.91\ 6 \\ 133.26\ 6 \\ 288.76\ 3 \\ 184.99\ 0 \\ \hline \text{Paid } 491.96\ 6 \\ \hline \text{Remains due} \\ \hline \hline \end{array}</math> </td> </tr> </table>	Borrowed of W. at several times.	{	$\begin{array}{r} \text{\textcircled{X}} 152.91\ 6 \\ 133.26\ 6 \\ 288.76\ 3 \\ 184.99\ 0 \\ \hline \text{Paid } 491.96\ 6 \\ \hline \text{Remains due} \\ \hline \hline \end{array}$
Lent to B. at several times	{	$\begin{array}{r} \text{\textcircled{X}} 35.45\ 0 \\ 53.54\ 5 \\ 28.75\ 6 \\ 47.63\ 8 \\ \hline \text{Received } 99.90\ 0 \\ \hline \text{Remains due} \\ \hline \hline \end{array}$					
Borrowed of W. at several times.	{	$\begin{array}{r} \text{\textcircled{X}} 152.91\ 6 \\ 133.26\ 6 \\ 288.76\ 3 \\ 184.99\ 0 \\ \hline \text{Paid } 491.96\ 6 \\ \hline \text{Remains due} \\ \hline \hline \end{array}$					

## CASE 3.

Where the Substratum and Subtrahend are both aggregates.

Rule. 1. Take the unit figure of the sum of the right hand column in the Subtrahend, from that of the column directly above it in the Substratum, and set down the difference below it.

2. If the unit figure of the Subtrahend be the larger, borrow 10 as in Simple Subtraction, and add 1 to the number of tens in the sum of the Subtrahend.

3. After this, balance the tens of each part; if they are equal in number there is none to carry to the next.

column in either of the aggregates—if they are unequal, carry the balance to that aggregate which has the most.—Continue this operation thro' all the columns from the right hand to the left.

*Q. How is the work proved?*

*A.* By doing it at large; that is, finding the sum total of each aggregate and subtracting the one from the other.

### EXAMPLES.

1.

*Explanation.*

$$\begin{array}{l}
 \left\{ \begin{array}{l} 97823 \\ 45641 \\ 37298 \end{array} \right. \quad \begin{array}{l} 7+2+5=14: 8+1+3=12: 12-4= \\ 8(8) \text{ balance of tens 1 in favor of the Sub-} \\ \text{trahend, therefore say } 1+8+4+6=19: \\ 9+4+2=15: 15-9=6(6) \text{ balance of} \\ \text{tens again 1 to the Subtrahend, therefore} \\ \left\{ \begin{array}{l} 74365 \\ 38742 \\ 45387 \end{array} \right. \quad \begin{array}{l} 1+3+7+3=14: 2+6+8=16: 6- \\ 4=2(2) \text{ balance of tens even. } 5+3+4 \\ =17: 7+5+7=19: 9-7=2(2) \text{ bal-} \\ 22268 \text{ ance even, } 4+3+7=14: 3+4+9= \\ =16-14=2(2). \end{array}
 \end{array}$$

*Practical Examples in the last Case.*

2.

*George Maxwell to Robert Cochran Dr.*

1796,				
Jan. 3.	To 5 yds. black Kerfimer, at 2.55	7	12.78	5
10.	To 25 do. Holland, at .75		18.75	
Feb. 19.	To 14 lb. Loaf Sugar, at .29		4.06	
	To 7 do. Hyson Tea, at 1.75		12.25	
	To 4 gall. Brandy, at 2.33		11.32	

1796,				
March 1.	By 10 bush. Wheat, at .75		7.50	
15.	By 3 cwt. Iron, 5.		15.00	
April 4.	By 150 lb. Cheese, at .08		12.00	
11.	By 63 do. Flax, at .13	3	8.37	9

*Balance due,*

# SUBTRACTION COMBINED. 79

3.

*Archibald Spiggot borrowed of Anthony Hotspur, at several times, the following sums of money, viz.*

1793, February 14,	£ 419.19 7
May 30,	621.60 0
September 3,	881.11 5
1794, March 23,	634.42 5
August 1,	1074.88 2

*Paid at several times, viz.*

1793, December 5.	919.54 0
1794, February 12.	1490.58 2
October 11.	349.99 0

*What remains due,  
exclusive of interest ?*

=====

## LESSON XVIII.

### MULTIPLICATION.

**Q.** **W**HAT is Multiplication ?

*A.* It is a concise method of Addition.

**Q.** What are the parts of Multiplication ?

*A.* 1. The *Multiplicand* or the sum to be multiplied.

2. The *Multiplier* or the sum multiplied by.

3. The *Product*, or answer to the question ; which is the sum total of the *Multiplicand* added to itself as often as there are units in the *Multiplier*.

**Q.** What are these several parts of Multiplication called, taken collectively ?

*A.* The *Multiplicand* and *Multiplier* are called *Factors*, and the *Product*, the *Fact*, *Rectangle* or *Square*.

**Q.** How is Multiplication generally divided ?

*A.* Into two kinds, viz. *Simple*, or *Single*, and *Compound*, or *Combined*.

**Q.** What is the definition of *Simple Multiplication*, as treated in this *Compendium* ?



*A.* It is where neither of the Factors exceed the number 12, and the Product is found by a single process of Multiplication simply, and without the combined operation of Addition; as 4 times 6 is 24.

*Q.* How are the parts to be arranged in Single Multiplication?

*A.* In a horizontal line, with the sign of Multiplication placed between the Factors, and the sign of Equality between the Factors and the Product; thus  $4 \times 4 = 16$ .

*Note.* Single Multiplication is a necessary preparation to combined Multiplication, and the whole of it is to be learnt perfectly by heart by the student, before he proceeds to the latter.

SINGLE MULTIPLICATION, commonly called  
the MULTIPLICATION TABLE.

$2 \times 2 = 4$	$4 \times 7 = 28$	$11 \times 2 = 22$
$2 \times 3 = 6$	$4 \times 8 = 32$	$11 \times 3 = 33$
$2 \times 4 = 8$	$4 \times 9 = 36$	$11 \times 4 = 44$
$2 \times 5 = 10$	$5 \times 5 = 25$	$11 \times 5 = 55$
$2 \times 6 = 12$	$5 \times 6 = 30$	$11 \times 6 = 66$
$2 \times 7 = 14$	$5 \times 7 = 35$	$11 \times 7 = 77$
$2 \times 8 = 16$	$5 \times 8 = 40$	$11 \times 8 = 88$
$2 \times 9 = 18$	$5 \times 9 = 45$	$11 \times 9 = 99$
$3 \times 3 = 9$	$6 \times 6 = 36$	$12 \times 2 = 24$
$3 \times 4 = 12$	$6 \times 7 = 42$	$12 \times 3 = 36$
$3 \times 5 = 15$	$6 \times 8 = 48$	$12 \times 4 = 48$
$3 \times 6 = 18$	$6 \times 9 = 54$	$12 \times 5 = 60$
$3 \times 7 = 21$	$7 \times 7 = 49$	$12 \times 6 = 72$
$3 \times 8 = 24$	$7 \times 8 = 56$	$12 \times 7 = 84$
$3 \times 9 = 27$	$7 \times 9 = 63$	$12 \times 8 = 96$
$4 \times 4 = 16$	$8 \times 8 = 64$	$12 \times 9 = 108$
$4 \times 5 = 20$	$8 \times 9 = 72$	
$4 \times 6 = 24$	$9 \times 9 = 81$	

The number 10, I have not noticed in the above Table, because it does not change the figures of its multiplicand in the product; and whenever you would multiply any number by 10, you have only to annex the cypher to it, and the product is found.

## LESSON XIX.

MULTIPLICATION *combined with* ADDITION.

**Q.** **H**OW are the factors in this Multiplication, to be placed to prepare them for the work ?

**A.** Place the Multiplier under the Multiplicand, so that units shall stand under units, tens under tens, &c. as in Addition ; and put the sign of Multiplication at the left hand of the Multiplier.

**Q.** What is the general rule of operation ?

**A.** Begin to multiply with the unit figure of the Multiplier, and with that multiply each figure in the Multiplicand from the right hand to the left ; in each single product, in the multiplication of whole numbers, set down only the overplus of complete tens, and add the number of tens last found to the product of the next multiplicand figure.

**Q.** In what order are the particular products to be set down, where there are two or more figures in the Multiplier ?

**A.** The first figure in each product is to be placed directly under it Multiplier.

**Q.** What is the reason of this rule ?

**A.** It is because the first figure in each product is ever of the same numerical denomination as its Multiplier ; units produce units, tens tens, hundreds produce hundreds ; therefore the product of the figure standing in hundreds' place in the Multiplier, must be thrown back into the place of hundreds in the product ; and so of the other denominations.

**Q.** What is the next step ?

**A.** After the process of Multiplication is completed then add all the particular products together, and their sum total will be the total product, or answer to the question.

**Q.** How do you prove Multiplication ?

A. In several ways, as

1. By inverting the factors, and multiplying them together so as to make the same total product as before.

2. By dividing the product by either of the factors, and finding the quotient just equal to the other factor. (The learner, however, is not yet supposed capable of this mode of proof.) Or

3. By a cross, which is the most easy and compendious method : viz. first add together all the figures in the multiplicand, casting out all the nines as you proceed—then add the figures of the multiplier in the same manner, and set the overplus of each on two sides of the Ecks, thus  $7 \times 6$ —then multiply those two figures together, and casting the nines out of the product, set the overplus at the top of the Ecks for a standard figure, thus 6 *Lastly*, add together all the

$7 \times 6$

figures in the total product, in the same manner ; place the overplus at the bottom of the Ecks, and if it be the same with the standard, or topmost figure, the work is proved.

Q. *What is the reason of this mode of proof?*

A. It arises, I conceive, from these peculiar properties in the number 9, viz. that whatever number it is multiplied by, the figures of its product added together will invariably make one, or more complete nines—and *secondly*, the product, in such case, will always lack just the number of the multiplier of being ten times its number.

#### CASE 1.

##### EXAMPLES.

1.

$$\begin{array}{r} 47613127 \\ \times 2 \\ \hline 95226254 \\ \hline \hline \hline \hline \end{array}$$

2.

$$\begin{array}{r} 47613174 \\ \times 3 \\ \hline \\ \hline \hline \hline \hline \end{array}$$

3.

$$\begin{array}{r} 71261312 \\ \times 4 \\ \hline \\ \hline \hline \hline \hline \end{array}$$



$$\begin{array}{r} 4. \\ 71261312 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \\ 73126184 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \\ 71312674 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \\ 31261267 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \\ 47612312 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \\ 31261731 \\ \times 11 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \\ 76138126 \\ \times 12 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \\ 82365243 \\ \times 11 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \\ 65423789 \\ \times 12 \\ \hline \end{array}$$

# CASE 2.

The Multiplier larger than 12.

## EXAMPLES.

1.	<i>Explanation.</i>
691861	$8 \times 1 = 8(8) 8 \times 6 = 48(8) 8$
$\times 978$	$\times 8 = 64 + 4 = 68(8) 8 \times 1 = 8 + 6 = 14(4)$
<hr/>	$8 \times 9 = 72 + 1 = 73(3) 8 \times 6 = 48 + 7 = 55$
5534888	$(55)$
4843027	$7 \times 1 = 7(7) 7 \times 6 = 42(2) 7 \times 8 = 56 + 4 =$
6226749	$60(0) 7 \times 1 = 7 + 6 = 13(3) 7 \times 9 = 63 + 1$
<hr/>	$= 64(4) 7 \times 6 = 42 + 6 = 48(48)$
676640058	$9 \times 1 = 9(9) 9 \times 6 = 54(4) 9 \times 8 = 72 + 5$
	$= 77(7) 9 \times 1 = 9 + 7 = 16(6) 9 \times 9 = 81$
	$+ 1 = 82(2) 9 \times 6 = 54 + 8 = 62(62)$

Lastly, add all these particular products, and the total product is found, viz. 'six hundred and seventy six millions, six hundred and forty thousand, and fifty eight.'

$$\begin{array}{r} \text{PROOF.} \quad 6 \\ 6 \times 4 \\ 6 \end{array}$$

*Explanation.* 6 and 1 (the 9 being thrown away) is 7 and 8 is 15, cast out 9 leaves 6, and 6 is 12, 9 out leaves 3 and 1 makes 4, which set upon the right side of the *Ecks*.

*Multiplier.* 9 is nothing : 7 and 8 make 15, 9 out leaves 6. Set it upon the left side of the *Ecks*—multiply those two numbers together, and the product is 24 ; cast out the nines, and the remainder is 6, which set at the top.

*Total Product.* Add the figures together the same way as in the factors, casting out all the nines, and the remainder will be 6, which set at the bottom of the *Ecks* and it being the same with the figure atop, the operation is proved.

2.	3.	4.	5.
129186	281216	181281	543764
$\times 98$	26	763	239
<hr/>	<hr/>	<hr/>	<hr/>
126659428	7311616	138317403	129959596
<hr/>	<hr/>	<hr/>	<hr/>
6.	7.	8.	9.
269181	261986	812617	281691
4629	7638	43859	76286
<hr/>	<hr/>	<hr/>	<hr/>
1246038849	2001049068	35640569003	21489079626
<hr/>	<hr/>	<hr/>	<hr/>

Q. Are there no exceptions to the foregoing case?

A. Yes. 1. When these figures, 1 and 1, or 1 and 2, happen together in any part of the multiplier, you may multiply by both at once, as in Case 1.

## EXAMPLES.

1.	2.	3.	4.
761312 × 412	671612 × 114	963458 × 912	843126 × 119
<hr/>	<hr/>	<hr/>	<hr/>
9135744 3045248	<hr/>	<hr/>	<hr/>
<hr/>			
313660544			
<hr/>			

21 *Exception.* When any other number between 12 and 20 happens, as 13, 14, 15, &c. then multiply by the figure in the units' place, and, as you multiply, add to the product of each single figure, that of the multiplicand which stands next on the right hand.

## EXAMPLES.

1.	2.	3.	4.
5497623 × 16	8413574 × 17	9364326 × 18	8128621 × 19
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>

31 *Exception.* When there is any number between 20 and 30, the multiplier, you may multiply in the same way, only add double the right hand figure.

## EXAMPLES.

1.	2.	3.
527392 × 25	643897 × 26	798346 × 27
<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>

## C A S E 3.

Q. What is the particular rule in the third case of Multiplication?

A. 1. Such Factors as have cyphers at the ends must be set down as if there were no cyphers.

2. Pay no attention to the cyphers until the multi-

D



plication is performed, and then annex the same number of cyphers to the total product, as there are in both the factors.

## EXAMPLES.

$$\begin{array}{r} 1. \\ 47600 \\ \times 170 \\ \hline \end{array}$$

$$\hline 80920000$$

$$\begin{array}{r} 2. \\ 180120 \\ \times 48100 \\ \hline \end{array}$$

$$\hline 8663772000$$

$$\begin{array}{r} 3. \\ 461210 \\ \times 81900 \\ \hline \end{array}$$

$$\hline 37773099000$$

$$\begin{array}{r} 4. \\ 760000 \\ \times 4800 \\ \hline \end{array}$$

$$\hline 3648000000$$

$$\begin{array}{r} 5. \\ 461200 \\ \times 72000 \\ \hline \end{array}$$

$$\hline 33206400000$$

$$\begin{array}{r} 6. \\ 618010 \\ \times 74210 \\ \hline \end{array}$$

$$\hline 45862522100$$

## CASE 4.

*Q. What is the particular rule in the fourth case of Multiplication?*

*A. When cyphers are placed between the significant figures in the Multiplier, omit them in the operation, observing to place the first figure of every particular product as before.*

## EXAMPLES.

$$\begin{array}{r} 1. \\ 128121 \\ \times 72001 \\ \hline \end{array}$$

$$\begin{array}{r} 128121 \\ 256242 \\ 896847 \\ \hline \end{array}$$

$$\hline 9224840121$$

$$\hline \hline$$

$$\begin{array}{r} 2. \\ 128128 \\ \times 70043 \\ \hline \end{array}$$

$$\hline 8974469504$$

$$\begin{array}{r} 3. \\ 246145 \\ \times 66012 \\ \hline \end{array}$$

$$\hline 14771653740$$

## C A S E 5.\*

*Q. How do you multiply any whole number by a sum in Federal Money, in order to find the price or value of the whole?*

*A. 1. Set down the factors as before; for the sake of convenience, placing that for the Multiplier which has the fewer figures.*

*2. Multiply the factors together as if they were both whole numbers, according to the general rule in Lesson XIX.*

*3. Point off, in the total product, as many right hand figures, as there were figures in the factor or price below dollars, for cents and mills—the rest are Dollars.*

## EXAMPLES.

*Q. What is the amount of 3257 yds. of Velvet, at  $\$ \times 3.55$  7 per yard?*

$$\begin{array}{r} 3257 \\ \times 3.557 \\ \hline 22799 \\ 16285 \\ 16285 \\ 9771 \\ \hline \end{array}$$

Answer, 11585.14 9

=====

By this single example, and still more by that in the next Case, the instructor, the merchant, and eve-

---

\* This and the following Case properly belong to Decimal Arithmetic, in the Third Part: But as the multiplication of Federal Money must be of such daily practical use; as its operation is plain and easy to the young beginner, and performed in exactly the same method as the multiplication of whole numbers, it was considered best to insert a short sketch of the subject in the First Part of the work. This may also serve as a specimen, both in rule and example, of all the other (proposed) Federal Tables, without their being particularly noticed in Multiplication.

ry man possessed of the knowledge of practical Arithmetic, will readily discern the simplicity and superior excellency of our Federal currency, in all the various branches of money calculation.

## C A S E 6.

*Q. How do you multiply a mixed quantity of any of the (proposed) Federal Tables, by any sum in Federal money, in order to determine its value or price?*

*A. 1. Place the Factors, and multiply them as before.*

*2. From the total product, point off as many right hand figures as there were figures in both the Factors, below their ultimate Integers, or the highest denomination in their respective Tables; then the figures standing upon the left hand of the point, are dollars; the two figures next upon the right hand of the point are cents; the third mills; and if there be any more they are cast away, being less than the ultimate fraction, one mill.*

## EXAMPLE.

*mw. c. lb.*

A farmer sold 34.70 65 of Hay,

at  $\$ \times 4.833$  per thousand weight :

*What did he receive in the whole?*

104295  
 104295  
 104295  
 139060

Answer, 150.63 6(745

*This example, I conceive, evinces the practical utility that would result from having all our Commercial Tables of mixed quantities conformed to our Federal money, and established upon a decimal scale.*

Questions for exercise, in the two last Cases.

1. *Q. What is the price of 37543 acres of Land, at  $\$4.75$  per acre?* Answer, 178329.25.



2. Q. What would be the impost duty on 1538 bushels of Salt, at //15  $\text{P}$  bushel? Answer,  $\text{X}$ 230.70.

3. Q. A merchant bought 756 gal. of Rum, at  $\text{X}$ 1.34  $\text{P}$  gallon; what sum did he have to pay? Ans. 275.04.

4. Q. How much is 23 mwt. 1c. 25 lb. of bloomery Iron, worth, at  $\text{X}$ 40.26  $\text{P}$  mwt.? Answer, 935.61 6.

5. Q. A silver-smith purchased 34 lb 5 oz. 6 dw. 7 grs. Federal Troy weight, of old Silver, for 58 cents  $\text{P}$  oz. how much did he give for the whole? Ans.  $\text{X}$ 200.49.

6. Q. A gentleman built him an house, which required 47 td. 5g. and 75 feet of boards, to complete it, for which he paid at the rate of  $\text{X}$ 5.45  $\text{P}$  thousand feet; how much did that article enhance the expence of the building?

Answer,  $\text{X}$ 271.28.

7. Q. A pedlar bought of a printer, 3 gr. 6 desm and 5 Almanacks, for  $\text{X}$ 6.50  $\text{P}$  gross; how much did the whole cost him? Answer, 23.72.

8. Q. He retailed them, by the single, at //12; what did he receive for them, and what were his neat gains?

Answer,  $\text{X}$ 43.80 received in the whole.  
20.07 his neat gain.

## L E S S O N XX.

### CROSS MULTIPLICATION, or DIAGONAL INVOLUTION.

Q. IS there not a shorter method of performing Multiplication, both of whole numbers and the mixed quantities of the Federal Tables?

A. Yes. A method which saves all the figures in the operation, after the factors are stated, but those of the total product, let the multiplier be ever so large.

Q. What is it called?

A. Cross Multiplication, or Diagonal Involution.

Q. What is the benefit of this rule?

A. After the learner is well versed in the common method of multiplication, he may easily attain the

knowledge of this ; which by a little use will become equally familiar and easy ; and as it greatly shortens the operation, it will be found proportionably advantageous in practice.

*Q. What is the principle of the operation ?*

*A.* It is the same as that in the 2d and 3d exceptions in the 2d case of Lesson XIX, and is in reality but extending the same rule to a multiplier of the same, or any larger number of figures.

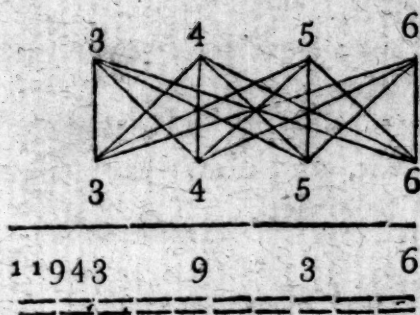
*Q. How is the operation performed ?*

*A.* 1 Set down the factors as before.

2. Multiply the two unit figures of the factors together, and set down the unit figure of the product according to the common rule.

3. As you proceed with the unit figure of the multiplier, carry the work in your mind, and add the product of the first figure of the multiplier and second of the multiplicand, with that of the second figure of the multiplier and first of the multiplicand ; setting down and carrying as before.—At the next step, add the product of the second and third figures of the multiplier, with the first and second of the multiplicand, to that of the first figure of the multiplier, and third of the multiplicand—multiplying both ways from corner to corner. Proceed in the same manner with all the remaining figures, taking in another left hand figure in both factors, at every new step of the process ; so that if there be an equal number of figures in the factors, you will multiply the right hand figure of the multiplier, with the left of the multiplicand, and the left of the multiplier with the right of the multiplicand and add their products with those of all the intermediate figures multiplied in this way, at the same step.

The following example with diagonal lines drawn between the figures, together with the explanation subjoined, will clearly illustrate the operation of the rule ; whilst the same example wrought at large, will prove its truth, and brevity.



The same wrought at large.

$$\begin{array}{r}
 3456 \\
 \times 3456 \\
 \hline
 20736 \\
 17280 \\
 13824 \\
 10368 \\
 \hline
 11943936
 \end{array}$$

*Explanation.*

$6 \times 6 = 36$  (6);  $6 \times 5 = 30 + 3 = 33$ ;  $5 \times 6 = 30 + 33 = 63$  (3);  $6 \times 4 = 24 + 6 = 30$ ;  $4 \times 6 = 24 + 30 = 54$ ;  $5 \times 5 = 25 + 54 = 79$  (9);  $6 \times 3 = 18 + 7 = 25$ ;  $3 \times 6 = 18 + 25 = 43$ ;  $4 \times 5 = 20 + 43 = 63$ ;  $5 \times 4 = 20 + 63 = 83$  (3): The unit figures of the factors are now dismissed.  $5 \times 3 = 15 + 8$  to carry = 23;  $3 \times 5 = 15 + 23 = 38$ ;  $4 \times 4 = 16 + 38 = 54$  (4): The tens are now dismissed.  $4 \times 3 = 12 + 5$  to carry = 17;  $3 \times 4 = 12 + 17 = 29$  (9): The hundreds are now dismissed.  $3 \times 3 = 9 + 2$  to carry = 11 (11.)

The operation is now closed; producing eleven millions, nine hundred and forty-three thousand, nine hundred and thirty-six. Compare this example with the work done at large in the common method, and it is found to save 20 figures in this small sum.

## CASE 2.

*Q. How do you perform Cross Multiplication, where the factors consist of unequal numbers of figures?*

*A. 1. Set the factors as before, the smallest for the multiplier.*

*2. Multiply in the same manner as before, and after you have multiplied the unit, or right hand figure of the multiplier, into the one standing immediately over its left hand figure, continue the process with each remaining figure of the multiplicand, just as if all the figures of the multiplier were, at every step, removed one figure farther towards the left hand; and,*



for convenience sake, you may set a point over each figure of the multiplicand, standing on the left hand of the multiplier, when you multiply it by the right hand figure of the multiplier, and under each right hand figure, as soon as it is dismissed.

## EXAMPLES.

1.  
 $\begin{array}{r} 59271 \text{ acres of Land,} \\ \text{at } \times 5.75 \text{ }^{\text{p}} \text{ acre?} \end{array}$

340808.25 Answer.

2.  
 $\begin{array}{r} 7854362 \\ \times 5268 \end{array}$

41376779016

*Explanation of Example 1.*

$5 \times 1 = 5$  (5);  $5 \times 7 = 35$ ;  $7 \times 1 = 7 + 35 = 42$  (2);  $5 \times 2 = 10 + 4 = 14$ ;  $5 \times 1 = 5 + 14 = 19$ ;  $7 \times 7 = 49 + 19 = 68$  (8): Now dismiss the unit figure of the multiplicand, and set the multiplier under the figures 927.  $5 \times 9 = 45 + 6$  to carry = 51;  $5 \times 7 = 35 + 51 = 86$ ;  $7 \times 2 = 14 + 86 = 100$  (0): Now dismiss the tens in the multiplicand, and set the multiplier under 592.  $5 \times 5 = 25 + 10$  to carry = 35;  $5 \times 2 = 10 + 35 = 45$ ;  $7 \times 9 = 63 + 45 = 108$  (8): Now dismiss the hundreds in the multiplicand, and the units in the multiplier.  $7 \times 5 = 35 + 10$  to carry = 45;  $5 \times 9 = 45 + 45 = 90$  (0): Dismiss the thousands in the multiplicand, and tens in the multiplier.  $5 \times 5 = 25 + 9$  to carry = 34 (34). This finishes the multiplication.

Lastly, point off the two right hand figures for cents, because there were cents in the multiplier, and the whole work is finished, producing three hundred and forty thousand, eight hundred and eight dollars, and twenty-five cents.

## CASE 3.

Q. How do you improve this Rule in Book-keeping?

A. Place the factors, which are the commodity and price, at each entry, in a horizontal line; then multiply them together as before; carefully observing not to take

a wrong figure in the multiplicand, and carry out the product in a right hand column.

2. Cast away in the operation, without setting them down, all the right hand figures in the product, next to the three below dollars.

## EXAMPLES.

*Thomas Baxter to Joseph Manly*

Dr.

To 325 yds. Coating, at	℥2.33 3		758		22		5
To 75 do. Satin, at	3.25		185		25		

*Explanation of the first Entry.*

$5 \times 3 = 15$  (5 mills and 1 cent to carry);  $5 \times 3 = 15 + 1 = 16$ ;  $2 \times 3 = 6 + 16 = 22$  (2 in the units' place of cents);  $5 \times 3 = 15 + 2 = 17$ ;  $3 \times 3 = 9 + 17 = 26$ ;  $2 \times 3 = 6 + 26 = 32$  (2 in the dimes' place)  $5 \times 2 = 10 + 3 = 13$ ;  $3 \times 3 = 9 + 13 = 22$ ;  $2 \times 3 = 6 + 22 = 28$  (8 in the units' place of dollars);  $2 \times 2 = 4 + 2 = 6$ ;  $3 \times 3 = 9 + 6 = 15$  (5 in the tens' place of dollars);  $3 \times 2 = 6 + 1 = 7$  (7 in the hundreds' place of dollars,--making seven hundred and fifty-eight dollars, twenty-two cents and five mills.

## L E S S O N XXI.

## D I V I S I O N, IN GENERAL.

Q. **W**HAT is Division?

A. It is a concise method of performing many Subtractions. It shews how many times one number is contained in another, and how many remains.

Q. *How many parts are there in Division?*

A. Four; viz.

1. The *Dividend*, or number to be divided.
2. The *Divisor*, or number by which the division is made.
3. The *Quotient*, or the number of times that the divisor is contained in the dividend, which is the answer to the question.

4. The *Remainder*, or the number left after the work is performed, which is always less than the divisor, and of the same kind with the Dividend.

*Q. Which of these are certain, and which not?*

*A.* The three first are certain and necessary—the *remainder* is uncertain, as in the operation of some numbers there is none left.

*Q. How many sorts of division are there?*

*A.* Division may be generally divided into Simple or Single Division, and Combined Division.

## L E S S O N XXII.

### SINGLE DIVISION, or the DIVISION TABLE.

**Q.** **W**HAT is *Single Division*?

*A.* Single Division is where the quotient is found by the operation of Division simply, without the combination of any of the other first rules, and without having any remainder.

#### C A S E 1.

*Q. What is peculiar in the 1st case of Single Division?*

*A.* The quotient is found by one single process of the divisor.

*Q. How are the parts to be arranged in this case?*

*A.* In a horizontal line—the dividend first, the divisor next, with the *statement* sign of division between them, and then the quotient separated by the sign of equality. This is just the reverse of the Multiplication Table, and may be usefully learned by heart.



## EXAMPLES.

18 ÷ 2 = 9	30 ÷ 5 = 6	24 ÷ 8 = 3
16 ÷ 2 = 8	25 ÷ 5 = 5	16 ÷ 8 = 2
14 ÷ 2 = 7	20 ÷ 5 = 4	81 ÷ 9 = 9
12 ÷ 2 = 6	15 ÷ 5 = 3	72 ÷ 9 = 8
10 ÷ 2 = 5	10 ÷ 5 = 2	63 ÷ 9 = 7
8 ÷ 2 = 4	54 ÷ 6 = 9	54 ÷ 9 = 6
6 ÷ 2 = 3	48 ÷ 6 = 8	45 ÷ 9 = 5
4 ÷ 2 = 2	42 ÷ 6 = 7	36 ÷ 9 = 4
27 ÷ 3 = 9	36 ÷ 6 = 6	27 ÷ 9 = 3
24 ÷ 3 = 8	30 ÷ 6 = 5	18 ÷ 9 = 2
21 ÷ 3 = 7	24 ÷ 6 = 4	99 ÷ 11 = 9
18 ÷ 3 = 6	18 ÷ 6 = 3	88 ÷ 11 = 8
15 ÷ 3 = 5	12 ÷ 6 = 2	77 ÷ 11 = 7
12 ÷ 3 = 4	63 ÷ 7 = 9	66 ÷ 11 = 6
9 ÷ 3 = 3	56 ÷ 7 = 8	55 ÷ 11 = 5
6 ÷ 3 = 2	49 ÷ 7 = 7	44 ÷ 11 = 4
36 ÷ 4 = 9	42 ÷ 7 = 6	33 ÷ 11 = 3
32 ÷ 4 = 8	35 ÷ 7 = 5	22 ÷ 11 = 2
28 ÷ 4 = 7	28 ÷ 7 = 4	108 ÷ 12 = 9
24 ÷ 4 = 6	21 ÷ 7 = 3	96 ÷ 12 = 8
20 ÷ 4 = 5	14 ÷ 7 = 2	84 ÷ 12 = 7
16 ÷ 4 = 4	72 ÷ 8 = 9	72 ÷ 12 = 6
12 ÷ 4 = 3	64 ÷ 8 = 8	60 ÷ 12 = 5
8 ÷ 4 = 2	56 ÷ 8 = 7	48 ÷ 12 = 4
45 ÷ 5 = 9	48 ÷ 8 = 6	36 ÷ 12 = 3
40 ÷ 5 = 8	40 ÷ 8 = 5	24 ÷ 12 = 2
35 ÷ 5 = 7	32 ÷ 8 = 4	

The number ten is omitted as a divisor in the above Table; because whenever 10 is the divisor, you have only to cut off the right hand figure of the dividend for a remainder, and the other figures are the quotient sought.

## CASE 2.

*Q.* How are the parts to be arranged in this case?

*A.* Set the divisor first, and the operation sign between it and the dividend, and the quotient either at the right hand, or underneath, without the sign of equality.

## EXAMPLES.

1. 2) 24 — 12 —	2. 3) 6390 — 2130 —	3. 4) 48884 — =====	4. 5) 205555 — =====
5. 6) 546 — ==	6. 7) 4907 — ==	7. 8) 72808 — =====	8. 9) 6399 — ==
			9. 10) 85690 — =====

## L E S S O N XXIII.

DIVISION *combined with* MULTIPLICATION *and* SUBTRACTION.

Q. **H**OW is this rule generally divided?

A. Into Short and Long Division.

Q. How are these distinguished?

A. In Short Division, the divisor does not exceed 12: In Long Division, it consists of any greater number.

## SHORT DIVISION.

Q. What is the rule of operation?

A. Inquire how often the divisor is contained in the first left hand figure of the dividend, and if that be too small to contain it, take the two first; set that number down for the first left hand figure of the quotient—*next*, multiply the divisor by the quotient figure, and subtract the product from the figure or figures taken in the dividend, and to the remainder annex the next figure of the dividend for a new dividend (performing this operation in your mind only) and extend the same process to each remaining figure of the dividend successively, setting down only the quotient.

*Q. How do you dispose of the final remainder?*

*A. Annex it fractionwise to the quotient, with the divisor under it, as in the first example following.*

## EXAMPLE.

5) 61231280

12246256

*Explanation.* 5 in 6, 1 (1) 1 left ; in 11, 2 (2) 1 left ; 5 in 12, 2 (2) 2 left ; 5 in 23, 4 (4) 3 left ; 5 in 31, 6 (6) 1 left ; 5 in 12, 2 (2) 2 left ; 5 in 28, 5 (5) 3 left ; 5 in 30, 6 (6) and 0 left.

2) 71367413

3) 42310812

4) 13812612

5) 61231281

6) 312610851

7) 713126719

8) 701267131

9) 126713108

11) 7312613107

12) 3812617314

11) 1622728131

12) 1731261712

## L E S S O N XXIV.

## L O N G D I V I S I O N.

## C A S E I.

*Q. WHAT is the general rule in Long Division?*

*A. Set down the parts as in Short Division—multiply the divisor by the quotient figure, and set down the product at large ; subtract it from the dividend, and to that remainder annex the next right hand figure in the dividend, for a new dividend. This operation must be repeated for every remaining figure in the dividend.*

*Q. How do you prove division?*

*A. It may be proved in two several ways, viz.*

1. By multiplying the quotient by the divisor, and adding the remainder, if there be any, to the product—if this equal the dividend, the work is proved.

2. It may be done with less trouble and equal certainty, with an X, by a rule similar to that of proving multiplication. *First.* Add together all the fi-



figures in the divisor, casting out the *nines*, and set down the overplus upon the right side of the character. *Secondly*, do the same with the quotient, and set the overplus upon the left hand of the *Ecks*. *Thirdly*, multiply those figures together, and casting the *nines* out of the product, set down the overplus at the top, for a standard figure.—*Lastly*, add all the figures of the dividend in the same manner, and set the overplus at the bottom, which if equal to the standard figure the operation is right.

*Q. What must be done in this case, if there be a remainder?*

*A.* Add all the figures of the Remainder, as in the other parts, and subtract the overplus from that of the Dividend, and that remainder will be the same number as the standard figure if the work be right. But if the overplus of the remainder, be larger than that of the Dividend, then borrow 9, which is the *terminus* figure, instead of 10, to subtract from; and to that difference add the overplus of the Dividend, which will equal the standard figure.

#### EXAMPLES

$$91 \overline{) 72165871 (793031}$$

$$\underline{637}$$

$$\underline{846}$$

$$\underline{819}$$

$$\underline{275}$$

$$\underline{273}$$

$$\underline{287}$$

$$\underline{273}$$

$$\underline{141}$$

$$\underline{91}$$

$$\underline{(50)}$$

Proof, with its Explanation.

$$\begin{array}{r} 5 \\ 5 \times 1 \\ 5 \end{array}$$

$$\text{Divisor } 9 = 0 + 1 = 1 \text{ (1)}$$

$$\text{Quotient } 7 + 3 = 1 + 3 + 1 \text{ (5)}$$

$$\text{Standard } 1 \times 5 = 5 \text{ (5)}$$

$$\text{Dividend } 7 + 2 = 0 + 1 + 6 + 5 = 3 + 8 =$$

$$2 + 7 = 0 + 1 = (1)$$

$$\text{Rem. } 5 + 0 = 5 \text{ Lastly } 1 + 9 - 5 = 5 \text{ the proof figure.}$$

82)31712617(	19)73261714(	3164)31917352(
73)27342694(	381)73247231(	6528)42697326(
64)47342637(	773)32756373(	2932)52436237(
55)73582063(	947)23489734(	33408)27364432(
46)75535754(	762)32846273(	73246)94264824(
37)34235772(	7628)28937432(	86257)37431749(
28)73264624(	3247)34937352(	23724)34285362(

## C A S E 2.

When cyphers stand at the end of the divisor, they must be cut off, and the same number of figures must be cut off from the dividend.

The figures cut off in the dividend, must be annexed to the remainder at last.

## EXAMPLES.

625 00)712653 52(	528 000)75556 075(
426 00)713524 74(	452 000)75653 585(

## L E S S O N XXV.

**Q.** *Is there not a shorter method of performing Long Division?*

**A.** Yes; a method which saves one half the number of figures.

**Q.** *How is it done?*

**A.** 1. When you multiply the divisor by the quotient figure, subtract the figures of the product immediately from the dividend, without setting them down, according to the method of Compound Subtraction; and set down only the remainders.

2. When you have to borrow ten in the subtraction, add one, to the number of tens which you have to carry in the multiplication, to the product of the next divisor figure.

This method, by a little exercise, will become equally familiar and easy to the learner, and will be found very useful in practice.

Take the Example, wrought at large in Lesson XXIV,  
for an Example of this Rule.

91)72165871(793031

846

275

287

141

(50)

Comparing this Example with  
the same wrought at large, we find  
14 figures saved in 28.

## L E S S O N XXVI.

*Division of Federal Money, by a Divisor not  
exceeding 12.*

**Q.** *How is the operation performed?*

**A.** 1. In the same manner as Short Division of  
Whole Numbers; only observing to point off by itself  
the quotient of dollars in the dividend, for the same  
denomination in the quotient.

2. Where the highest denomination expressed in the  
dividend does not contain the divisor, the first deno-  
mination in the quotient will be the same as the second  
in the dividend.

### EXAMPLES.

§ 1.

7)3.55 5(

§ 2.

6)45.25 8(

// 3.

5)3 3(

// 4.

5)44 4

§ 5.

9)672.07 7(

§ 6.

8)827.72 6(

§ 7.

4)25.66 6(

§ 8.

3)88.22 3(



$\text{₤ } 9.$	$\text{₤ } 10.$	$\text{₤ } 11.$	$\text{₤ } 12.$
$11)576.16 \text{ 7(}$	$12)83.54 \text{ 9(}$	$11)100.83 \text{ 3(}$	$12)3.67 \text{ 2(}$
<hr/>	<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>	<hr/>

CASE 2.

*Long Division of Federal Money.*

Q. How is the operation performed?

A. 1. Place the parts, and divide, just as in the division of whole numbers.

2. The placing of the separating point in the quotient, is by the same rule as in the former case of Short Division.

EXAMPLES.

$\text{₤ } \text{ // } / \text{ // } /$		
$82)31.71 \text{ 2(}$	$\text{₤ }$	$\text{₤ }$
<hr/>	$95) 743.15 \text{ 9(}$	$2345)28754.19 \text{ 6(}$
$711$	$323) 826.600 \text{ (}$	$5432)69245.78 \text{ 9(}$
<hr/>	$147)8968.07 \text{ 0(}$	$3254)89694.45 \text{ 7(}$
$552$	$183)5096.00 \text{ 9(}$	$4523)48962.87 \text{ 5(}$
<hr/>	$212)9125.00 \text{ 0(}$	$1765)98765.43 \text{ 2(}$
Rem. (60)		

less than a mill.

For the mutual division of Decimal mixed quantities, the learner is referred to the division of Decimal Fractions, in the Third Part.

L E S S O N XXVII.

*Addition of Mixed Quantities of the Vulgar Tables.*

Q. **W**HAT is the general rule of operation in the Addition of mixed quantities?

A. After the several numbers in the statement are set down, according to rule in Lesson XII, add together all the numbers of the same denomination, beginning with the lowest denomination expressed in any of

the given quantities, and set down underneath it, in the sum total, the surplus which it contains over and above the complete number of its terminus; and for every time its terminus is contained, carry one to the next higher denomination.

2. The highest denomination in every table of mixed quantities consists of whole numbers, and is to be added as such.

3. Set down the amount of the last left hand denomination, in the highest denomination which it will admit.

*Q. What are the PENCE TABLES, so called?*

*A. These following, viz.*

20d. = 1/8	80d. = 6/8	2s. = 24d	8s. = 96d.
30d. = 2/6	90d. = 7/6	3s. = 36d.	9s. = 108d.
40d. = 3/4	100d. = 8/4	4s. = 48d.	10s. = 120d.
50d. = 4/2	110d. = 9/2	5s. = 60d.	11s. = 132d.
60d. = 5/0	120d. = 10/0	6s. = 72d.	12s. = 144d.
70d. = 5/10		7s. = 84d.	

*Note. This Table is to be learned by heart.*

#### EXAMPLES.

##### 1. MONEY.

1.	2.	3.
£. s. d.	£. s. d.	£. s. d.
44,, 12,, 6 $\frac{1}{4}$	25,, 11,, 11 $\frac{1}{2}$	47,, 12,, 6 $\frac{1}{2}$
31,, 18,, 1 $\frac{1}{2}$	16,, 12,, 6	31,, 17,, 3
47,, 12,, 4	11,, 9,, 10 $\frac{1}{2}$	17,, 13,, 11 $\frac{3}{4}$
14,, 12,, 10 $\frac{1}{4}$	16,, 12,, 4 $\frac{1}{4}$	18,, 14,, 10 $\frac{1}{2}$
16,, 14,, 11	34,, 1,, 10	16,, 15,, 11
19,, 12,, 2	17,, 14,, 11 $\frac{1}{4}$	17,, 14,, 4 $\frac{1}{2}$
<hr/>	<hr/>	<hr/>
£. 175,, 2,, 11 $\frac{1}{2}$		
=====	=====	=====

*Explanation of the Example wrought.*

I first add up the farthings, and find their amount to be 6; this being 2 over its terminus, or making one

*penny halfpenny*, I set down only the halfpenny, and carry the one to the place of pence : the amount of the pence I find 35, which, by the Pence Table, is 2/11; I therefore set down the 11 pence, and carry 2 to the place of shillings: the amount of the shillings I find 82, which being £.4.,2, I set down the 2 shillings, and carry 4 to the place of pounds : the number of pounds being added, I find the whole sum total to be *one hundred and seventy-five pounds, two shillings and eleven pence halfpenny*.

2. TROY WEIGHT.

1.	2.	3.	4.
lb. oz. dw. gr.	lb. oz. dw. gr.	lb. oz. dw. gr.	lb. oz. dw. gr.
4., 11., 13., 14	7., 13., 12	4., 10., 12., 13	7., 10., 12., 10
8., 6., 9., 2	6., 10., 14	3., 10., 16., 12	3., 4., 16., 13
<u>          </u>	9., 12., 17	4., 9., 16., 14	4., 13., 16., 12
13., 6., 2., 16	16., 13	3., 3., 19., 13	4., 3., 16., 13
<u>=====</u>	<u>=====</u>	<u>=====</u>	<u>=====</u>

The operation of the above examples being wrought by the same general rule with those in the former Table, it is judged unnecessary to insert a particular explanation in this and the following Tables.

3. AVOIRDUPOIS WEIGHT.

T. c. q. lb.	T. c. q. lb.	c. q. lb.	lb. oz. dr.
4., 12., 3., 16	7., 00., 1., 16	17., 3., 12	14., 10., 12
3., 15., 1., 13	1., 12., 3., 10	26., 2., 19	26., 12., 10
<u>          </u>	3., 4., 3., 17	24., 1., 12	29., 12., 12
8., 8., 1., 1	3., 1, 2., 12	26., 3., 9	27., 2., 3
<u>=====</u>	<u>=====</u>	<u>=====</u>	<u>=====</u>

4. APOTHECARY WEIGHT.

lb. ʒ ʒ ð gr.	lb. ʒ ʒ ð gr.	lb. ʒ ʒ ð gr.
3., 11., 7., 2., 19	7., 3., 3., 2., 10	7., 3., 4., 2., 10
6., 3., 4., 2., 3	3., 2., 2., 4	6., 2., 7., 2., 4
2., 7., 2., 9	2., 3., 4., 2., 8	3., 7., 2., 4., 9
4., 2., 2., 2., 8	6., 2., 3., 2., 10	2., 3., 4., 0., 10
<u>=====</u>	<u>=====</u>	<u>=====</u>
<u>=====</u>	<u>=====</u>	<u>=====</u>



## ADDITION OF

## 5. CLOTH MEASURE.

1.	2.	3.	4.
yds.gr.na.	ells.gr.na.	yds.gr.na.	yds.gr.na.
37,,2,,2	44,,0,,2	27,,2,,3	37,,2,,3
20,,3,,3	27,,3,,2	36,,3,,3	37,,2,,3
35,,3,,3	55,,4,,3	34,,1,,2	45,,3,,3
39,,3,,3	49,,3,,3	39,,4,,0	16,,2,,0
<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
=====	=====	=====	=====

## 6. LAND MEASURE.

1.	2.	3.
A. r. p.	A. r. p.	A. r. p.
27,,3,,22	37,,2,,32	26,,3,,36
32,,2,,23	35,,3,,33	43,,2,,33
35,,0,,20	16,,3,,37	34,,3,,35
36,,1,,34	39,,3,,36	46,,2,,28
<u>      </u>	<u>      </u>	<u>      </u>
=====	=====	=====

## 7. LIQUID MEASURE.

1.	2.	3.
Tier. g. q.	Hhd. gal.qts.	T.hhd.gal.qts.
37,,34,,3	27,,24,,2	7,,2,,46,,3
46,,40,,2	47,,13,,3	6,,3,,35,,2
66,,10,,3	49,,8,,2	7,,1,,41,,2
89,,31,,2	29,,12,,3	6,,2,,16,,1
<u>      </u>	<u>      </u>	<u>      </u>
=====	=====	=====

## 8. DRY MEASURE.

1.	2.	3.	4.
Gal. qt. pt.	Pe.gal.qt.	B. p. qt.	Can.b. p. qt.
16,,3,,2	6,,1,,2	89,,3,,6	98,,2,,3
47,,1,,0	9,,0,,3	47,,2,,6	9,,3,,6
69,,3,,0	1,,1,,0	35,,3,,7	79,,3,,2
88,,0,,1	2,,0,,3	42,,0,,4	14,,3,,6
<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
=====	=====	=====	=====

9. LONG MEASURE.

<i>M. fur. p.</i>	<i>Yds. f. in.</i>	<i>Le. m. fur. p.</i>	<i>Yds. f. in. b. c.</i>
17,,7,,19	44,,2,,7	56,,2,,7,,30	16,,1,,0,,0
26,,8,,9	16,,0,,4	48,,1,,2,,18	56,,2,,9,,1
60,,3,,16	39,,1,,10	54,,2,,1,,20	48,,1,,4,,2
40,,4,,19	46,,2,,4	90,,2,,7,,9	45,,2,,8,,2
=====	=====	=====	=====

10. TIME.

<i>M. w. d.</i>	<i>H. m. sec.</i>	<i>M. w. d.</i>	<i>D. h. m. sec.</i>
46,,1,,6	47,,10,,32	34,,2,,1	27,,19,,40,,45
24,,2,,5	27,,44,,43	23,,3,,6	19,,20,,16,,28
16,,3,,6	24,,44,,54	56,,2,,4	47,,10,,43,,40
39,,3,,5	4,,6,,5	50,,3,,7	40,,30,,49,,54
=====	=====	=====	=====

11. MOTION.

<i>o</i>	<i>i</i>	<i>ll</i>	<i>o</i>	<i>i</i>	<i>ll</i>	<i>o</i>	<i>i</i>	<i>ll</i>
47,,	40,,	54	47,,	56,,	49	47,,	13,,	32
46,,	25,,	36	27,,	10,,	31	70,,	59,,	44
47,,	56,,	59	56,,	54,,	35	98,,	56,,	54
54,,	45,,	56	90,,	45,,	34	44,,	36,,	59
=====	=====	=====	=====	=====	=====	=====	=====	=====

LESSON XXVIII.

SUBTRACTION of Mixed Quantities.

Q. **W**HAT is the rule of operation?

A. After the given quantities are set down according to the rule in the Lesson XII, begin the subtraction in the lowest denomination expressed in either of the given sums or quantities, proceeding towards the left hand, subtracting each quantity in the subtrahend from that of the same denomination standing directly above it in the substratum, and setting down the dif-

ference directly underneath, in a third row, for the remainder; first drawing a line between the statement and the work, and observing to keep the several denominations separated by the proper marks.

2. If the quantity in any of the lower denominations in the *subtrahend* be smaller than the one standing above it in the *substratum*, take the upper number so many more than its *terminus*, and read the next denomination in the *substratum* one the less; but if it be a vacant denomination, or there are several vacant denominations coming together, call each and all of them in the work one less than its *terminus*, and the next left hand quantity one less than its figures. In the highest given denomination, the subtraction is ever the same as that of whole numbers.

If this mode of subtracting mixed quantities prove more unhandy to the young beginner than the common mode, the instructor can direct him to that, which is performed by subtracting the lower quantity from the *terminus* of its denomination, and to this difference adding the upper quantity for a remainder; add one in such case to the next left hand quantity in the *subtrahend*.

Note. *Proof is by the same method as in whole numbers.*

## EXAMPLES.

## 1 MONEY.

	£. s. d.	£. s. d.	£. s. d.	£. s. d.
From	14, 10, 6 $\frac{1}{2}$	41, 15, 3	76, 11, 4 $\frac{1}{2}$	78, 7, 6
Take	3, 17, 7 $\frac{1}{2}$	19, 17, 1 $\frac{1}{2}$	13, 17, 7	19, 14 $\frac{1}{2}$
Rem.	£ 10, 12, 11			

## 2 TROY-WEIGHT.

	oz. dw. gr.	oz. dw. gr.	oz. dw. gr.	lb. oz. dw. gr.
From	78, 10, 12	78, 5, 20	23, 16, 12	84, 4, 11, 12
Take	2, 10, 19	20, 4, 19	5, 19, 14	17, 10, 11, 17
Diff.				



# MIXED QUANTITIES.

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## AVOIRDUPOIS-WEIGHT.

	<i>C.gr.lb.</i>	<i>C.gr.lb.</i>	<i>T.c.gr.</i>	<i>T.c.gr.lb.</i>
Bought	71,2,18	17,2,13	17,10,2	12,2,3,20
Sold	3,1,26	10,2,13	20,19,3	5,3,2,20
Unfold				

## 4. APOTHECARY-WEIGHT.

	<i>3.3.3.gr.</i>	<i>3.3.3.gr.</i>	<i>lb.3.3.3.gr.</i>
From	65,4,2,10	47,5,1,16	48,2,2,0,19
Take	7,7,2,12	2,1,2,18	10,1,2,2,17

## 5. LONG-MEASURE.

	<i>L.m.f.p.</i>	<i>Yd.f.in.b.c.</i>	<i>L.m.f.p.</i>
From	71,1,3,10	40,0,3,2	64,0,3,4
Take	25,2,5,20	26,0,2,2	23,2,3,20

## 6. CLOTH-MEASURE.

	<i>Yds.gr.na.</i>	<i>Yds.gr.na.</i>	<i>Yds.gr.na.</i>
From	71,3,1	52,2,3	148,0,0
Take	14,2,3	16,1,3	86,0,3

## 7. LAND-MEASURE.

	<i>A.r.p.</i>	<i>A.r.p.</i>	<i>A.r.p.</i>	<i>A.r.p.</i>
Purchased	12,1,12	25,3,17	28,1,7	32,0,9
Plowed	5,3,17	12,3,23	19,1,28	16,2,24

Rem. Unpl.

## 8. LIQUID-MEASURE.

	<i>T.hhds.gal.</i>	<i>T.hhds.gal.</i>	<i>Gal.qts.pts.</i>	<i>Gal.qts.pts.</i>
From	3, 2, 10	7, 2, 10	19, 2, 1	67, 1, 1
Take	1, 3, 19	1, 2, 28	12, 3, 0	12, 3, 0

## 9. DRY-MEASURE.

	<i>B.p.qts.</i>	<i>B.p.gal.qts.pt.</i>	<i>C.b.p.qts.</i>
From	45,2,4	67,0,1,3,0	23,2,5
Take	29,3,6	38,8,0,2,1	7,4,6
	<u>          </u>	<u>          </u>	<u>          </u>
	<u>          </u>	<u>          </u>	<u>          </u>

## 10. TIME.

	<i>D. h. m. sec.</i>	<i>W. d. h. m. sec.</i>	<i>W. d. h. m. sec.</i>
From	41,13,22,12	144,10,30,34	35,3,23,13,30
Take	22,35,44,34	30,3,19,48,26	10,3,14,6,35
	<u>          </u>	<u>          </u>	<u>          </u>
	<u>          </u>	<u>          </u>	<u>          </u>

## 11. MOTION.

	<i>° / "</i>	<i>° / "</i>	<i>° / "</i>
From	48,20,24	47,2,30	63,34,35
Take	35,33,34	20,24,56	49,34,44
	<u>          </u>	<u>          </u>	<u>          </u>
	<u>          </u>	<u>          </u>	<u>          </u>

## L E S S O N XXIX.

*Multiplication of the Mixed Quantities in the Vulgar Tables.*

**W**HAT do you observe in this kind of Multiplication?

A. Multiply by a whole number; carry for the particular *terminus* of each denomination in the given quantity, as in Addition, and set down only the over-plus.

In CASE 1, The multiplier does not exceed 12.

In CASE 2, Take two figures, which multiplied together, will make the multiplier, and multiply the given quantity by one of those figures, and that product by the other; as where the multiplier is 35, multiply by 7, and that product by 5.

C A S E 1.

<i>£. s. d.</i>	<i>lb. oz. dw. gr.</i>	<i>T. c. qr. lb.</i>	<i>Yds. f. in. b. c.</i>
25, 7, 6 $\frac{1}{4}$	57, 5, 12, 16	2, 13, 3, 14	37, 2, 3, 1
$\times 4$	$\times 5$	$\times 6$	$\times 7$
=====	=====	=====	=====
=====	=====	=====	=====

<i>Yds. qr. na.</i>	<i>G. qt. pt.</i>	<i>A. r. p.</i>	<i>D. h. m. sec.</i>	<i>o. / //</i>
56, 3, 2	28, 2, 1	26, 3, 36	57, 54, 44, 45	30, 16, 20
$\times 8$	$\times 9$	$\times 11$	$\times 12$	$\times 5$
=====	=====	=====	=====	=====
=====	=====	=====	=====	=====

C A S E 2.

<i>£. s. d.</i>	<i>lb. oz. dw. gr.</i>	<i>T. c. qr. lb.</i>
47, 14, 9 $\frac{1}{2}$	39, 10, 17, 8	18, 6, 3, 15
$\times 35$	$\times 48$	$\times 72$
=====	=====	=====
=====	=====	=====

<i>yds. qr. n.</i>	<i>T. gal. qr.</i>	<i>A. r. p.</i>	<i>D. h. m.</i>	<i>H. m. sec.</i>
28, 2, 3	29, 17, 3	26, 3, 13	14, 19, 21	47, 13, 32
$\times 56$	$\times 88$	$\times 63$	$\times 132$	$\times 144$
=====	=====	=====	=====	=====
=====	=====	=====	=====	=====

L E S S O N XXX.

*Division of Mixed Quantities in the Vulgar Tables.*

Q. **H**OW do you perform this Division?

A. Place the parts as in Division of Whole Numbers; multiply the remainder in the division of each denomination, by the terminus of the next lower denomination, and to the product add the given quantity of that denomination for a new dividend.



## THE DIVISION OF MIXED QUANTITIES.

£. s. d.	lb. oz. dw. gr.	T. c. qr. Dr.
2) 48, 12, 6 $\frac{1}{2}$	3) 14, 10, 3, 6	4) 17, 1, 1, 14
<u>£. 24, 6, 3 <math>\frac{1}{4}</math></u>	<u>                    </u>	<u>                    </u>

lb. oz. dr.	M. f. p.	Yds. f. in. l. c.
5) 46, 12, 10	6) 38, 2, 14	7) 46, 0, 10, 2
<u>          </u>	<u>          </u>	<u>          </u>
<u>          </u>	<u>          </u>	<u>          </u>
<u>          </u>	<u>          </u>	<u>          </u>

Yds. qr. n.	Mo. w. d.	D. h. m. sec.	o	1	11
8) 16,, 2,, 2	9) 48,, 2,, 2	12) 46,, 16,, 12, 30	12) 33,, 4,, 7		
<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>		
<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>		
<u>          </u>	<u>          </u>	<u>          </u>	<u>          </u>		

END OF THE FIRST PART.





*The American Accomptant, &c.*

P A R T II.

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L E S S O N I.

C O M M U T A T I O N,

I N G E N E R A L.

Q. **W**HAT is Commutation?

A. It is the changing of numbers or quantities of one or more denominations, into others of different denominations, but of the same value.

Q. *How is Commutation generally distributed?*

A. Into Reduction\* and Consolidation; and each of these again into those *direct* and *indirect*.

Q. *What is Reduction?*

A. Changing greater names into smaller, as pounds into shillings, dollars into dimes, days into hours, &c.

Q. *What is Consolidation?*

A. It is the reverse of Reduction, or changing small-

---

\* *The old division of this rule into Reduction ascending and Reduction descending, is discarded as an abuse of language: The first of these is a self-contradiction, and the latter a mere tautology: The one is descending upward, and the other descending downward.*

er names into greater, as shillings into pounds, cents into dollars; or a lower into a higher currency, as that of the State of New-York into the lawful money of New-England.

*Q. What is Commutation direct?*

*A.* It is either reducing or consolidating any given sum or quantity into other names of the same Table, as pounds into shillings, or shillings into pounds; dollars into cents, and cents into dollars, &c.

*Q. What is Commutation indirect?*

*A.* It is changing a given quantity in any table of currency, weight or measure, into the denominations of a different table—as changing Avoirdupoise into Troy weight, Liquid into Dry measure, lawful money of New-England into federal money, and the reverse.

## L E S S O N II.

### R E D U C T I O N D I R E C T.

**Q.** **W**HAT is the general rule of performing direct Reduction?

*A. RULE.* Multiply the highest denomination given by the terminus of the next lower denomination, adding to the product the given quantity of that denomination: This product multiply by the terminus of the next lower denomination, adding as before; and repeat the same process until the whole is reduced to the denomination required.

EXAMPLES in each Table.

1. Reduce £15,,12,,8½ into farthings.

Terminus of shill.  $\times 20$

Term. of pence,  $\begin{array}{r} 312 \\ \times 12 \\ \hline \end{array}$

Term. of farth.  $\begin{array}{r} 3752 \\ \times 4 \\ \hline \end{array}$

Answer, 15010

2. In £127,,15,,4 how many pence and groats?

Answer, 28984 pence: 7246 groats.



*Note. The Commutation of Federal Money might naturally be placed under the head of this Lesson: but as it affords some curious and distinguishing rules, and is soon to be the universal Currency of the United States, it is judged best to reserve it as the subject of a distinct Lesson.*

TROY WEIGHT.

lb. oz. dw. gr.

3. Reduce 15, 7, 16, 12 of gold into grains.

Term. of oz.  $\times 12$

187

Term. of dw.  $\times 20$

3756

Term. of gr.  $\times 24$

Ans. 90156 grains.

Explanation.

$$\begin{array}{l} 15 \times 12 + 7 = 187: 187 \times 20 \\ + 16 = 3756: 3756 \times 24 + 12 \\ = 90156, \text{ the number of grains} \\ \text{in lb. 15, 7, 16, 12.} \end{array}$$

AVOIRDUPOIS WEIGHT.

T. c. gr. lb.

4. Reduce 25, 17, 3, 15, into ounces.

Term. of cwt.  $\times 20$

517

Term. of qr.  $\times 4$

2071

Term. of lb.  $\times 28$

58003

Term. of oz.  $\times 16$

Ans. 928018 ounces.

Explanation.

$$\begin{array}{l} 25 \times 20 + 17 = 517: 517 \times 4 + 3 = \\ 2071: 2071 \times 28 + 15 = 58003: \\ 58003 \times 16 = 928048 \text{ ounces.} \end{array}$$

## COMMUTATION.

## APOTHECARY WEIGHT.

lb.  $\frac{3}{4}$  3  $\oslash$  gr.5. In 7..3..1., 2., 11 how many grains. *Ans.* 41871.

$$\frac{3}{4} \times 12$$


---

$$87$$

$$3 \times 8$$


---

$$697$$

$$\oslash \times 3$$


---

$$2093$$

$$gr \times 20$$


---

*Ans.* 41871 grains.*Explanation.*

$$\overbrace{7 \times 12 + 3} = 87 : \overbrace{87 \times 8 + 1} = 697 :$$

$$\overbrace{697 \times 3 + 2} = 2093 : \overbrace{2093 \times 20 + 11} = 41871 \text{ grains.}$$

## LONG MEASURE.

6. In 75 miles, how many barley-corns?

$$\text{Term. of r.} \times 320$$


---

$$24000$$

$$\text{T. of f.} \times 16\frac{1}{2}$$


---

$$384000$$

$$12000$$


---

$$396000$$

$$\text{of in.} \times 12$$


---

$$4752000$$

$$\text{of b.c.} \times 3$$


---

*Ans.* 14256000 barley-corns.*Explanation.*

$$75 \times 320 = 24000 \text{ rods: } 24000 \times 16\frac{1}{2}$$

$$396000 \text{ feet: } 396000 \times 12 = 4752000$$

$$\text{inches: } 4752000 \times 3 = 14256000 \text{ b. c.}$$

CLOTH MEASURE.

*Yds. gr. na.*

7. In 17, 3, 3 how many nails?

*Term. of gr.  $\times 4$*

—

71

*Term. of na.  $\times 4$*

—

*Ans. 287 nails.*

==

LAND MEASURE.

8. In 45 acres, how many square inches?

*Term. of r.  $\times 160$*

—

7200

*in. in a r.  $\times 198$*

—

*Ans. 1425600 inches.*

==

LIQUID MEASURE.

9. A general, upon a field day, gave a puncheon of spirits to his soldiers, to drink his health: it was dealt out in the quantity of half a gill to a man: What was the number of the brigade? *Ans. 2560 men.*

DRY MEASURE.

10. A merchant paid out £86, 13, 4 for 325 bushels of wheat: How much did he give  $\frac{1}{4}$  pint?

*Ans. 1 penny per pint.*

TIME.

11. How many seconds in a year, consisting of 365 days, 5 hours, 48 minutes and 55 seconds?

*Ans. 30956935.*

12. How many hours since the nativity of Christ, to the present hour?

MOTION.

13. How many seconds are contained in the twelve signs of the Zodiac? *Ans. 129600.*



14. A certain city was laid out in a square form, intersected by 13 streets, at right angles, into small squares; each square contained 2 acres of ground; each quarter acre an house, and each house 7 persons: What was the number of squares, of acres, of houses, and of people. *Ans.* 144 squares, 288 acres, 2304 houses, and 16128 people.

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## L E S S O N III.

### CONSOLIDATION DIRECT.

**Q.** **W**HAT is direct Consolidation?

*A.* It is changing a given sum or quantity, of a smaller, into a larger name of the same Table; as pence into pounds, days into years, &c.

**Q.** What is the rule of operation?

*A.* **RULE. 1.** Divide the given number by the *terminus* of its denomination; that quotient by the *terminus* of the next higher denomination, and so on, until you arrive to the denomination required; observing that the quotient rises one denomination higher at every division made. Or,

2. Divide the given sum or quantity by the *grand terminus* of its denomination, *viz.* that number which makes an unit in the denomination required: the quotient is the answer; and the remainder, if any, must be consolidated according to the other rule, it being of the same denomination as the dividend, or given quantity.

**Q.** How is the grand terminus found?

*A.* By multiplying all the intermediate *termini* together; or, in other words, finding how many in the denomination of the given quantity, make one in the higher denomination required.

## EXAMPLES.

1. Consolidate 15010 farthings into pounds.

Rule 1.

$$4 \overline{) 15010}$$

$$12 \overline{) 3752\frac{1}{2}} \text{ pence.}$$

$$20 \overline{) 312} \text{ shill. \& 8 d.}$$

$$\text{Ans. } \underline{\underline{\underline{\underline{\pounds 15., 12., 8\frac{1}{2}}}}}$$

Rule 2.

$$G.t. 96 \overline{) 15010} \pounds 15. 12. 8\frac{1}{2}$$

$$\underline{541}$$

$$\underline{610}$$

$$\underline{\times 20}$$

$$96 \overline{) 122010} 12$$

$$\underline{260}$$

$$\underline{68}$$

$$\times 12 \text{ \&c.}$$

2. How many pounds are contained in 89916 grains of gold? *Ans.* 15lb. 7oz. 6dwt. 12gr.

3. In 27856lb. Avoirdupoise, how many tons?

$$A. 12T. 8cwt. 2qrs. 24lb.$$

4. In 8145lb. of wheat, how many bushels, allowing 60lb to a bushel? *A.* 135bush. & 3pecks.

5. Reckoning the aforesaid quantity of wheat at 1 penny 3 farthings per lb. how much is it per bush. and what is the price of the whole?

$$A. 8/9 \text{ per bush. and } \pounds 59., 7., 9\frac{3}{4} \text{ price of the whole.}$$

6. In 41871 grains, Apothecary weight, how many pounds? *A.* 7lb. 83 13 20 11gr.

7. How many miles are contained in 14256000 barley-corns? *Ans.* 75.

8. In 12376 nails of cloth, how many yards?

$$A. 773\frac{1}{2} \text{ yards.}$$

9. In 2560 quarts, how many puncheons? *Ans.* 8.

10. In 59752 quarts, how many bushels, U. S. measure, and how many of Canada measure?

$$A. 1867 \text{ bush. 1 peck, U. S. measure:}$$

$$1493 \text{ bush. 4 pecks, Can. ditto.}$$

11. If a man travels 13246 miles in 225360 min-

utes, improving only 12 hours in a day; what progress does he make in a minute; how many hours is he on horseback, and how many days employed in performing the journey?

A. He progresses 18 rods, 13 feet,  $4\frac{1392}{22536}$  inches per min. He is 3756 hours on horseback, and is 313 days performing the journey.

---

## L E S S O N IV.

### INDIRECT COMMUTATION, *in general.*

Q. **W**HAT is the general rule of operation?

A. The general rule which applies in all cases of exchange, between any two different tables of mixed quantities, is founded upon the reciprocal proportion existing between the particular kind of currency, weight or measure of the given sum or quantity, and that into which it is to be changed. From the same principle also spring all the particular rules, which, for the benefit of shortening the work, may be applied in certain cases.

Having found this reciprocal proportion, in as small whole numbers as the proportion will admit, it being perhaps as 2 to 5, or 3 to 4, or 1 to 6, or whatever the proportion may be; then, if the operation be *Reduction*, or in the descending line of exchange, take the following

#### GENERAL RULE.

Multiply the given sum or quantity by the larger proportional number, and divide that product by the smaller. If the smaller proportional number lack but *one* of the larger, then divide the given quantity by the smaller, and add the quotient to the dividend. If the smaller be a single unit, then you have only to multiply by the larger.



*For the reverse, or CONSOLIDATION.*

Multiply by the smaller proportional, and divide by the larger. If the difference between them be but 1, then divide the given quantity by the larger, and subtract the quotient from the dividend. If the smaller be a single unit, then you have only to divide by the larger.

*Give Examples under each branch of the aforementioned Rules.*

1. REDUCTION.

1. Let it be required to change 75 English ells into ells Flemish.

Here the proportion being as 3 to 5, therefore

Multiply 75  
by 5

Divide by 3)375(

Ans. 125 Flemish ells.

2. Reduce 56 bushels of wheat, Canada measure, into bushels of the U. S. The proportion is as 4 to 5.

4)56(  
× 14

Ans. 70 bush. U. S.

3. Reduce 39 Spanish milled dollars into pistareens. Proportion 1 to 5.

39  
× 5

Ans. 195 pistareens.

2. CONSOLIDATION.

1. Change 125 ells Flemish into English ells.

## COMMUTATION.

$$\begin{array}{r} 125 \\ \times 3 \\ \hline 5)375( \end{array}$$

*Ans.* 75 *English ells.*

2. Change 70 bushels U. S. into Canada bushels.

$$\begin{array}{r} 5)70( \\ -14 \\ \hline \end{array}$$

*Ans.* 56 *Bush. Can.*

3. In 195 pistareens, how many Spanish dollars.

$$\begin{array}{r} 5)195( \\ \hline \end{array}$$

*Ans.* 39 *Span. doll.*

*Note. Further Examples may be seen, under the particular Rules, in the following Lessons.*

## L E S S O N V.

The mutual Exchange between each and all the various Money Currencies of *Pounds, Shillings and Pence.*

## S E C T. 1.

STERLING MONEY exchanged.

**Q.** **H**OW do you reduce Sterling Money into Irish Money?

*A. RULE.* Add one twelfth part.

Reduce £100 S. into *l. m.*

$$\begin{array}{r} 12)100,00,00 \\ +8,6,8 \\ \hline \end{array}$$

*Ans.* £108,, 6,, 8

Reduce £49,, 18,, 8

$$\begin{array}{r} 12)49,,18,,8 \\ +4,,3,,2\frac{1}{2} \\ \hline \end{array}$$

*Ans.* £54,, 1,, 10½

# COMMUTATION.

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**Q.** How do you reduce Sterling into Halifax money?

**A. RULE.** Add one ninth part. If the given sum be pounds simply, only annex a cypher; and divide by

9.

$$\begin{array}{r} \text{Reduce } £100 \\ 9 \overline{)1000(} \\ \hline \end{array}$$

$$\text{Ans. } £111, 2, 2\frac{1}{2}$$

$$\begin{array}{r} \text{Reduce } £54, 4, 6 \\ 9 \overline{)54, 4, 6(} \\ \hline +6, 0, 6 \\ \hline \end{array}$$

$$£60, 5, 0$$

**Q.** How do you reduce Sterling money into the currency of South-Carolina and Georgia?

**A. RULE.** Add one twenty-seventh part.

$$\text{Reduce } £100, 00, 0$$

$$27 \overline{)100(} + 3, 10, 4\frac{1}{2}$$

$$19 \text{ A. } 103, 10, 4\frac{1}{2}$$

$$\times 20$$

$$27 \overline{)380(10}$$

$$10$$

$$\times 12$$

$$27 \overline{)120(4}$$

$$12$$

$$\times 4$$

$$27 \overline{)48(1}$$

$$(21)$$

$$\text{Reduce } £175, 15, 9$$

$$27 \overline{)175, 15, 9(} + 6, 10, 2$$

$$13$$

$$\text{A. } 182, 5, 11$$

$$\times 20$$

$$27 \overline{)275(10}$$

$$5$$

$$\times 12$$

$$27 \overline{)60(2}$$

$$(6)$$

**Note.** In the above Examples, the common divisor and the quotient figures are repeatedly expressed: this is only for the sake of greater perspicuity, but is unnecessary to the practitioner.

**Q.** How do you reduce Sterling money into the currency of New-Hampshire, Massachusetts, Rhode-Island, Connecticut, Virginia, Vermont and Kentucky?

G



## COMMUTATION.

*A. RULE. Add one third.*

Reduce £100 Sterling.

$$\begin{array}{r} 3)100(+33,6,8 \\ \hline \end{array}$$

*Ans. £133,6,8*

Reduce £27,19,6 Sterl.

$$\begin{array}{r} +9,6,6 \\ \hline \end{array}$$

*Ans. £37,6,0*

*Q. How do you reduce Sterling money into the currency of New-Jersey, Pennsylvania, Delaware and Maryland currency?*

*A. RULE. Multiply the given sum in Sterling money by 5, and divide the product by 3.*

Reduce £100 Sterling. to New-Jersey, &c.

$$\begin{array}{r} 100 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 3)500( \\ \hline \end{array}$$

*Ans. £166,13,4*

Reduce £55,14,10 Sterl.

$$\begin{array}{r} \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 3)278,14,2 \\ \hline \end{array}$$

*Ans. £92,14,0½*

*Q. What is the rule of reducing Sterling money into the currency of New York and North-Carolina?*

*A. RULE. Multiply by 16, and divide the product by 9.*

Reduce £100 Sterl. to New-York, &c. currency.

$$\begin{array}{r} 100 \\ \times 16 \\ \hline \end{array}$$

$$\begin{array}{r} \times 16 \\ \hline \end{array}$$

$$\begin{array}{r} 9)1600 \\ \hline \end{array}$$

*Ans. £177,15,6½*

Reduce £44,4,4 Sterl.

$$\begin{array}{r} \times 16 \\ \hline \end{array}$$

$$\begin{array}{r} 9)707,9,4 \\ \hline \end{array}$$

*Ans. £78,12,1½*

## SECT. 2.

IRISH MONEY exchanged.

*Q. How do you change Irish into Sterling money?*

*A. RULE. From the given sum deduct one thirteenth part.*

# COMMUTATION.

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Consolidate £100 Irish money into Sterling. Consol. £54,, 1,, 10½ Irish.

13)100

—7,, 13,, 10

Ans. £92,, 6,, 2

13)54,, 1,, 10½

—4,, 3,, 2½

Ans. £49,, 18,, 8

Q. How do you change Irish into Halifax money?

A. RULE. Add onethirty-ninth part to the given sum.

Reduce £100 Irish, into Halifax money.

39 ) 100 ( 2,, 11,, 3¼

+100

£102,, 11,, 3¼ Answer.

Q. How do you reduce Irish money into the currency of South-Carolina and Georgia?

A. RULE. Multiply by 112, and divide the product by 117.

Reduce £100 Irish into S. Carolina & Georgia cur. Reduce £35,, 7,, 4 Irish, into S. Car. &c. currency.

100 X 112 = 11200

117)11200(A.95, 14, 6¼

Ans. 33,, 17,, 1¼

670

85

20

)1700(

530

62 &c.

Q. What is the rule of reducing Irish money into the currency of New-Hampshire, Massachusetts, &c.?

## COMMUTATION.

A. RULE. Multiply by 16, and divide the product by 13.

Reduce 100*l.* Irish into  
into L. M. of N. E.

$$\begin{array}{r} 100 \\ \times 16 \\ \hline 13 \overline{) 1600} \end{array}$$

*Ans.* 123,, 1,, 6

Reduce 184,, 13,, 4 Irish.

$$\begin{array}{r} 184,, 13,, 4 \\ \times 4 \times 4 = 16 \\ \hline \end{array}$$

$$\begin{array}{r} 738,, 13,, 4 \\ \times 4 \\ \hline \end{array}$$

$$13 \overline{) 2954,, 13,, 4}$$

*Ans.* 227,, 5,, 9

=====

Q. By what method is the value of any sum in Irish money found, in the currency of New-Jersey, Pennsylvania, Delaware and Maryland?

A. RULE. Multiply it by 20, and divide the product by 13.

Reduce £100 Irish into  
New-Jersey, &c. currency.

$$\begin{array}{r} 100 \\ \times 20 \\ \hline \end{array}$$

$$13 \overline{) 2000}$$

*Ans.* 153,, 12,, 3 $\frac{1}{2}$

=====

Reduce £48,, 15,, 3 Irish.

$$\begin{array}{r} 48,, 15,, 3 \\ \times \times 4 = 20 \\ \hline \end{array}$$

$$\begin{array}{r} 243,, 16,, 3 \\ \times 4 \\ \hline \end{array}$$

$$13 \overline{) 975,, 5,, 0}$$

*Ans.* 75,, 0,, 4

=====

Q. How do you reduce Irish money into the currency of New-York and North-Carolina?

A. RULE. Multiply the given Irish sum by 64, and divide the product by 39.



Reduce £100 Irish into  
New-York, &c. currency.

$$\begin{array}{r} 100 \\ \times 64 \\ \hline 39) 6400 ( \text{Ans. } 164,2 \\ \hline 250 \\ \hline 160 \\ \hline 4 \\ \times 20 \text{ \&c.} \end{array}$$

Reduce £87,14,2 Irish.

$$\begin{array}{r} 87,14,2 \\ \times 8 \times 8 = 64 \\ \hline 701,13,4 \\ \times 8 \\ \hline 39) 5613,6,8 ( \\ \hline 117 \\ 153 \\ \hline \text{Ans. } 143,18,10 \\ 36 \\ \times 20 \text{ \&c.} \end{array}$$

SECT. 3.

HALIFAX MONEY exchanged.

Q. How do you change Halifax money into Sterling?

A. RULE. Deduct one tenth part from the Halifax sum.

Consolidate £100 Hal-  
ifax into Sterling money.

$$\begin{array}{r} 10) 100 \\ - 10 \\ \hline \text{Ans. } 90 \\ \hline \hline \hline \end{array}$$

Consolidate 60l. 5s. Hal-  
ifax into Sterling money.

$$\begin{array}{r} 10) 60,5 \\ - 6,0,10 \\ \hline \text{Ans. } 54,4,2 \\ \hline \hline \hline \end{array}$$

Q. How is Halifax money changed into Irish money?

A. RULE. Deduct one fortieth part.

Change 100l. Halifax  
into Irish money.

$$\begin{array}{r} 4) 100 \\ - 2,10 \\ \hline \text{Ans. } 97,10 \\ \hline \hline \hline \end{array}$$

Consolidate 320l. 15s. 8d.  
Halifax.

$$\begin{array}{r} 40) 430,15,8 (-8,00,4\frac{1}{2} \\ \hline \text{Ans. } 312,15,3\frac{1}{2} \\ \hline \hline \hline \hline \end{array}$$

*Q. How do you consolidate this currency into South-Carolina and Georgia currency?*

*RULE.* Subtract a fifteenth part.

Change 100*l.* Halifax Change 125*l.* 15*s.* Halifax.  
into South-Carolina, &c.

$$\begin{array}{r} 15)100 \\ -6,, 8 \\ \hline \end{array}$$

*Ans.* 93,, 12  
==

$$\begin{array}{r} 125,, 15 \\ 15)125,, 15(-8,, 9 \\ \hline \end{array}$$

6 *Ans.* 118,, 6  
20 &c. ===

*Q. How do you reduce Halifax money into the currency of New-Hampshire, Massachusetts, &c. currency.*

*RULE.* Add one fifth part.

Reduce 100*l.* Halifax  
into L. M. of N. E.

$$\begin{array}{r} 5)100 \\ +20 \\ \hline \end{array}$$

*Ans.* 120  
==

Reduce £87,, 15,, 10

$$+17,, 11,, 2$$

*Ans.* 105,, 7,, 0  
===

*Q. Give the rule of reducing Halifax money into N. Jersey, Pennsylvania and Maryland currency.*

*RULE.* To the given sum add one half.

Reduce 100*l.* Halifax to  
N. Jersey, &c. currency.

$$\begin{array}{r} 2)100 \\ +50 \\ \hline \end{array}$$

*Ans.* 150  
==

Reduce £327,, 19,, 8

$$+163,, 19,, 10$$

*Ans.* 491,, 19,, 6  
===

*Q. What is the method of changing Halifax money into the currency of New-York and North-Carolina?*

*RULE.* Multiply by 8, and divide the product by 5.

Reduce 100*l.* Halifax  
to N. Y. &c. currency.

# COMMUTATION.

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$$\begin{array}{r} 100 \\ \times 8 \\ \hline 5)800( \\ \hline \text{Ans. } 160 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \text{Reduce } £ 157, 17, 7 \\ \times 8 \\ \hline 5)1263, 0, 8 \\ \hline \text{Ans. } 252, 12, 1\frac{1}{2} \\ \hline \hline \end{array}$$

## SECT. 4.

SOUTH CAROLINA and GEORGIA Currency exchanged.

Q. What is the method of consolidating this currency into Sterling money?

RULE. From the given sum subtract one twenty-eighth part.

Change 100l. S. Caroli-  
na into Sterling money.

$$\begin{array}{r} 28)100 \\ \hline -3, 11, 5 \\ \hline \text{Ans. } 96, 8, 7 \\ \hline \hline \end{array}$$

Consolidate £ 182, 5, 11  
S. Carolina. — 6, 10, 2

$$\begin{array}{r} \hline \text{Ans. } 175, 15, 9 \\ \hline \hline \end{array}$$

Q. How do you change South-Carolina, &c. currency into Irish money?

RULE. Multiply the given sum by 117, and divide the product by 112.

Reduce 100l. S. Carol.  
into Irish money.

$$\begin{array}{r} 100 \times 117 = 11700 \\ 112)11700(104, 9, 3 \text{ Ans.} \\ \hline \hline \end{array}$$

$$\begin{array}{r} 500 \\ \hline \end{array}$$

$$\begin{array}{r} 52 \\ 20 \\ \hline \end{array}$$

$$\begin{array}{r} )1040( \\ \hline \end{array}$$

$$32$$

$$\times 12 \text{ &c.}$$

Reduce £ 33, 17, 1 S. Car.  
37, 17, 1

$$\times 9 \times 13 = 117$$

$$\begin{array}{r} 304, 13, 9 \\ \times 13 \\ \hline \end{array}$$

$$112)3960, 18, 9(35, 7, 3$$

$$\begin{array}{r} 600 \\ \hline \end{array}$$

$$40$$

$$\times 20 \text{ &c.}$$



Q. How do you change South Carolina, &c. currency, into Halifax money?

RULE. Add one fourteenth part.

Reduce 100*l.* S. Carol.

$$\begin{array}{r} 100 \\ 14 \overline{) 100} \quad + \quad 7, 2, 10 \\ \hline \end{array}$$

$$107, 2, 10 \text{ A.}$$

=====

Reduce £118., 6

$$14 \overline{) 118, 6} \quad + 8, 9$$

$$\text{Ans. } 126, 15$$

=====

Q. How do you reduce South-Carolina, &c. currency, into the lawful money of New-England?

RULE. Multiply the given sum by 9, and divide by 7.

Reduce 100*l.* S. Carol.  
into L. M. of N. E.

$$\begin{array}{r} 100 \\ \times 9 \\ \hline \end{array}$$

$$\times 9$$

$$7 \overline{) 900} (128, 11, 5 \text{ Ans.}$$

=====

Reduce £132., 13., 4

$$\times 9$$

$$7 \overline{) 1194, 0, 0}$$

$$\text{Ans. } 170, 11, 5$$

=====

Q. How do you reduce this currency into that of New-Jersey, &c.?

RULE. Multiply by 45, and divide the product by 28.

Reduce £100 S. Carol.

$$100 \times 45 = 4500$$

$$28 \overline{) 4500} (196, 8, 7 \text{ Ans.}$$

$$\begin{array}{r} 270 \\ \hline \end{array}$$

$$180$$

$$12$$

$$\times 20$$

$$)240($$

Reduce £234., 5., 6

$$\times 9 \times 5 = 45$$

$$2111, 11, 6$$

$$\times 5$$

$$28 \overline{) 10557, 27, 6}$$

$$\text{Ans. } 377, 1, 3$$

=====

Q. How do you reduce the currency of South-Carolina and Georgia into that of New-York and North-Carolina?

RULE. Multiply by 12, and divide by 7.

# COMMUTATION.

129

Reduce 100*l.* S. Carol.  
into N. Y. &c. currency.

$$100 \times 12 = 1200$$

$$7 \overline{) 1200}$$

$$\text{Ans. } 171, 8, 6\frac{2}{3}$$

=====

Reduce £125,, 15,, 5

$$\times 12$$

$$7 \overline{) 1509,, 5,, 0}$$

$$\text{Ans. } 215,, 12,, 1$$

=====

## SECT. 5.

LAWFUL MONEY of NEW ENGLAND exchanged.

Q. How do you consolidate this currency into Sterling money?

RULE. From the given sum subtract one fourth part.

Consolidate 100*l.* N. E.  
into Sterling money.

$$4 \overline{) 100}$$

$$- 25$$

$$\text{Ans. } 75$$

=====

Consolidate £37,, 6

$$4 \overline{) 37,, 6}$$

$$- 9,, 6, 6$$

$$\text{Ans. } 27,, 19,, 6$$

=====

Q. How is this currency changed into Irish money?

RULE. Multiply the given sum by 13, and divide the product by 16.

Change 100*l.* N. H. &c.  
into Irish money.

$$100 \times 13 = 1300$$

$$16 \overline{) 1300} (81,, 5 \text{ Ans.}$$

$$- 20$$

$$- 4$$

$$\times 20 \text{ \&c.}$$

$$73 \text{ \&c.}$$

Change £227,, 5,, 9 N. H.

$$227,, 5,, 9$$

$$\times 13$$

$$16 \overline{) 2953,, 14,, 9} (184,, 11,, 3$$

$$- 135$$

$$73 \text{ \&c.}$$

Q. How do you change the currency of New-Hampshire, Massachusetts, &c. into Halifax money?

RULE. From the given sum deduct one sixth part.

Change 100*l.* N. E.

$$6 \overline{) 100}$$

$$- 16,, 13,, 4$$

$$\text{Ans. } 83,, 6,, 8$$

Consolidate £105,, 7

$$6 \overline{) 105,, 7} (- 17,, 11,, 2$$

$$\text{Ans. } 87,, 15,, 10$$

Q. How do you change this currency into S. Carolina, &c. currency?

RULE. Multiply the given sum by 7, and divide by 9.

Change 100l. N. E. in- Change £170,,11,, 5  
to S. Carol. &c. currency. N. E.  $\times 7$

$$9)700=100 \times 7$$

Ans. 77,,15,,6

$$9)1193,,19,,11$$

Ans. 132,,13,,4

Q. How do you change the currency of N. Hampshire, &c. into the currency of N. Jersey, Pennsylvania, &c.?

RULE. To the given sum add one quarter.

Reduce 100l. N. E. in- Reduce £247,,14,, 4  
to N. Jersey, &c.  $\frac{1}{4}$  is +61,,18,, 7

$$100 \div 4 = 25: 100 + 25 = 125$$

Ans. 125

Ans. 309,,12,,11

Q. How do you reduce N. Hampshire, &c. currency, into that of N. York and North Carolina?

RULE. To the given sum add its one third part.

Reduce 100l. N. E. in- Reduce £95,,13,,8  
to N. York, &c. currency.  $3)95,,13,, 8$

$$3)100$$

$$+33,,6,,8$$

Ans. 133,,6,,8

$$+31,,17,,10\frac{1}{2}$$

Ans. 127,,11,,  $6\frac{1}{2}$

## SECT. 6.

The Currency of NEW-JERSEY, PENNSYLVANIA, DE-LAWARE and MARYLAND, exchanged.

Q. How do you consolidate this Currency into Sterling money?

RULE. Multiply the given sum by 3, and divide the product by 5.



# COMMUTATION.

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Change 100l. N. J. in-  
to Ster.  $\times 3$

$$\begin{array}{r} 5)300 \\ \hline \end{array}$$

Ans. 60

==

Change £322,,18,,9 N. J.

$\times 3$

$$\begin{array}{r} 5)968,,16,,3 \\ \hline \end{array}$$

Ans. 193,,15,,3

=====

Q. How do you consolidate this currency into Irish money?

RULE. Multiply the given sum by 13, and divide the product by 20.

Change 100l. N. J. &c. Consol. £75,,00,,5 N. J.  
currency into Irish money.  $\times 13$

$$20)1300=100 \times 13$$

Ans. 65

==

$$20)975,,5,,5$$

Ans. 48,,15,,3 $\frac{1}{4}$

=====

Q. How do you consolidate N. Jersey, &c. currency, into Halifax money?

RULE. From the given sum subtract one third part.

Change 100l. N. J. &c. Consol. £491,,19,,6  
into Halifax money. 3)491,,19,,6(-163,,19,,10

$$\begin{array}{r} 3)100 \\ -33,,6,8 \\ \hline \end{array}$$

Ans. 66,,13,,4

=====

Ans. 327,,19,,8

=====

In what manner do you consolidate the currency of N. Jersey, &c. into the currency of N. Hampshire, &c.?

RULE. From the given sum subtract one fifth part.

Change 100l. N. J. &c. Consol. £309,,12,,11 N. J.  
currency, into L. M. of -61,,18,,6

N. E. 5(100

$$\begin{array}{r} -20 \\ \hline \end{array}$$

Ans. 80

==

Ans. 247,,14,,4

=====

*In what manner do you reduce N. Jersey, &c. currency, into that of N. York and N. Carolina?*

RULE. To the given sum add one fifteenth part.

Change 100l. N. J. cur. Reduce £119, 19, 9 N. J. into that of N. Y. & N. C. 15)119, 19, 9 (+ 7, 19, 11 $\frac{2}{3}$ )

$$\begin{array}{r} 15 \overline{) 100} \\ + 6, 8 \\ \hline \end{array}$$

Ans. 106, 8

$$\begin{array}{r} \text{Ans. } 127, 19, 8\frac{2}{3} \\ \hline \hline \hline \end{array}$$

### SECT. 7.

NEW-YORK and N. CAROLINA Currency exchanged.

*Q. In what manner do you consolidate this currency into Sterling money?*

RULE. Multiply the given sum by 9, and divide the product by 16.

Change 100l. N. Y. &c. Consol. £78, 12, 2 N. Y. into Sterling money.

$$\begin{array}{r} 100 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 16 \overline{) 900} (56, 5 \text{ Ans.} \end{array}$$

$$\begin{array}{r} \times 9 \\ \hline 16 \overline{) 707, 9, 6} \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 44, 4, 4 \\ \hline \hline \hline \end{array}$$

*In what manner do you change N. York and N. Carolina currency into Irish money.*

RULE. Multiply the given sum by 39, and divide the product by 64.

Change 100l. N. Y. &c. Consol. £143, 18, 10 N. Y. into Irish money.

$$\begin{array}{r} 100 \\ \times 39 \\ \hline \end{array}$$

$$\begin{array}{r} 64 \overline{) 3900} (60, 18, 9 \text{ Ans.} \end{array}$$

$$\begin{array}{r} 60 \\ 20 \text{ &c.} \end{array}$$

$$\begin{array}{r} 143, 18, 10 \\ \times 3 \times 13 = 39 \\ \hline \end{array}$$

$$\begin{array}{r} 431, 16, 6 \\ \times 13 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans.} \\ 64 \overline{) 5613, 14, 6} (87, 14, 3 \end{array}$$

*How do you change N. York, &c. currency, into Halifax money?*

**RULE.** Multiply the given sum by 5, and divide the product by 8.

Change 100l. N. Y. cur. into Halifax money. Conf. £252,,12,, 2 N.Y.

$$\begin{array}{r} \times 5 \\ 8)500=100 \times 5 \\ \hline \text{Ans. } 62,,10 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \times 5 \\ 8)1263..00..10 \\ \hline \text{Ans. } 157,,17,, 7\frac{1}{4} \\ \hline \hline \end{array}$$

*Q. How do you consolidate the currency of New-York and N. Carolina into that of S. Carolina and Georgia?*

**RULE.** Multiply the given sum by 7, and divide the product by 12.

Change 100l. N. Y. &c. cur. into S. Carol. &c. Consol. £215,,12,, 2 N.Y.

$$12)700=100 \times 7$$

$$\text{Ans. } 58,,6,,8$$

$$12)1509,, 6,, 2$$

$$\text{Ans. } 125,,15,, 6$$

*Q. How do you consolidate N. York, &c. currency, into that of N. Hampshire, Massachusetts, &c.?*

**RULE.** From the given sum deduct one quarter.

Change 100l. N. Y. into L. M. of N. E. Consol. £127,,11,, 6 N.Y.

$$4)100$$

$$-25$$

$$\text{Ans. } 75$$

$$1 \text{ quarter } -31,,15,, 4\frac{1}{2}$$

$$\text{Ans. } 95,,16,, 1\frac{1}{2}$$

*Q. How do you consolidate New-York, &c. currency, into New-Jersey, &c. currency?*

**RULE.** Deduct one sixteenth part.

Change 100l. N.Y. &c. into N. J. &c. currency. Consol. £127,,19,, 9

$$16)100$$

$$-6,, 5$$

$$\text{Ans. } 93,,15$$

$$1 \text{ sixteenth } -7,,19,, 11\frac{1}{4}$$

$$\text{Ans. } 119,,19,, 9\frac{1}{4}$$



## LESSON VI.

The Exchange between the several Tables of  
*Weights and Measures.*

## S E C T. 1.

AVOIRDUPOIS & TROY WEIGHT *exchanged.*

**Q.** **H**OW do you change Avoirdupois weight into Troy weight?

**RULE.** Take the given weight in one denomination, either pounds, ounces, or drams.

If in pounds, multiply them by 175 and divide the product by 144, and the quotient will be Pounds Troy;

If in ounces, multiply by 175 and divide by 192: the quotient will be Troy ounces;

If in drams, multiply by 875, and divide by 768, and the quotient will be *penny weights.*

To reverse the operation, or to bring Troy into Avoirdupois weight, you have only to exchange the Multiplier and the Divisor and proceed as before.

## EXAMPLES.

Change 56 lb. 12 oz. Avoirdupois into Troy weight.

× 16

908 oz.

× 175

Tr. oz. lb. oz. dw. gr.

192)158900(827 = 68,, 11,, 12,, 2 *Ans.*

130

1460

116

× 20

)2320(12 &c.

*The Reverse.*

Change 68 lb. 11 oz. 12 dw. 2 gr. Troy weight, into Avoirdupois?

NOTE. In changing Troy grains into Avoirdupois weight, you have only to divide by 7000. Thus, 68 lb. 11 oz. 12 dw. 2 gr. = 397250 gr.

7000)397250(56 lb. 12 oz. Ans.

$$\begin{array}{r} 5250 \\ \times 16 \\ \hline \end{array}$$

$$)84000(12$$

SECT. 2.

VULGAR & FEDERAL AVOIRDUPOIS exchanged.

Q. What is the Rule.

RULE. Pounds being the same in both tables, the exchange is only between the ounces and drams; therefore to change ounces of the vulgar into those of the federal table, multiply them by 10, and divide the product by 16—to exchange them back, multiply by 16 and divide by 10.

EXAMPLES.

Q. What is the value of 8 oz. Avoird. in Fed. Avoird?

$$\begin{array}{r} 8 \\ \times 10 \\ \hline \end{array}$$

$$16)80(5 \text{ oz. Ans.}$$

Reverse the operation. 5 oz. Fed. Avoird.

$$\begin{array}{r} \times 16 \\ \hline \end{array}$$

$$10)80(8 \text{ oz. Vulg. Avoird.}$$

SECT. 3.

AVOIRDUPOIS and FEDERAL TROY or AMERICAN WEIGHT exchanged.

Q. What is the Rule?

RULE. Change them by making use of the following numbers, as Multipliers and Divisors, viz.

	Mult.	Div.	
For Avoirdupois pounds,	70	27	
ditto ounces,	175	108	
ditto drams,	4375	432	quot. gr.
In changing Federal } Troy Pounds,	27	70	
ditto ounces,	108	175	
ditto penny wt.	864	875	drams
ditto grains,	432	4375	Avoird.

## EXAMPLES.

Change 1 Ton into Federal Troy weight.

$$1 \text{ Ton} = 2240 \text{ lb.}$$

$$\times 70$$

$$\begin{array}{r} \text{lb.} \quad \text{oz.} \quad \text{dw.} \quad \text{gr.} \\ 27 \overline{) 156800} (5807 \cdot 4 \cdot 0 \cdot 7 \frac{1}{27} \text{ Anf.} \\ \underline{\hspace{1cm}} \end{array}$$

$$218$$

$$200$$

$$(11)$$

Change 5807 lb. 4 oz. 0 dw. 7 gr.  $\frac{1}{27}$  Fed. Troy into Avoird.

$$5807 \cdot 407 \frac{1}{27}$$

$$27$$

$$70 \overline{) 156800} \cdot 000$$

$$2240 \text{ lb.} = 80 \text{ qrs.} = 20 \text{ cwt.} = 1 \text{ Ton.} \text{ Anf.}$$

## S E C T. 4.

VULGAR and FEDERAL TROY WEIGHT exchanged.

Q. What is the Rule?

RULE. To change the vulgar into federal Troy weight, take the given weight in grains, annex a cypher, and divide by 27: the quotient will be Federal Troy weight, and of the same denomination.

2. To change federal into vulgar Troy weight, take the given weight in grains, multiply it by 27, point



off the right hand figure of the product, and the rest will be grains in Vulgar Troy.

EXAMPLES.

Change 57<sup>lb.</sup> 10<sup>oz.</sup> 8<sup>dw.</sup> 3<sup>gr.</sup> into Federal Troy weight.

× 12

—

694

× 20

—

13888

× 24

—

3333<sup>15</sup>

27)3333<sup>150</sup>(123450 grains.

—

lb. oz. dw.

63

123.3.5 Ansf.

—

93

121

135 &c.

The Reverse.

Change 123<sup>lb.</sup> 4<sup>oz.</sup> 5<sup>dw.</sup> federal, into vulgar Troy weight.

123450

× 27

3333<sup>150</sup>

lb. oz. dw.gr.

3333<sup>15</sup> grains = 57., 10., 8., 3

=====

SECT. 5.

FEDERAL AVOIRDUPOIS and FEDERAL TROY exchanged.

Q. What is the Rule?

RULE. To change federal Avoirdupois into federal Troy weight, multiply the given weight, in pounds, by 70, and divide the product by 27.

To change the other way, multiply by 27, and divide by 70.

EXAMPLES.

Change 100<sup>lb.</sup> fed. Avoird. into fed. Troy weight.

100 × 70 = 7000 lb. oz. dw. gr.

27)7000(259.2.5.9<sup>7</sup>/<sub>27</sub> Fed. Troy. Ansf.

—

10

250

(7)

H 2

*lb. oz. dw. gr.*  
Change 259. 2. 5. 9  $\frac{7}{27}$  Federal Troy.

259. 259  $\frac{7}{27}$

$\times 27$

70)7000.000

100 lb. Fed. Avoird. Ans.

### SECT. 6.

VULGAR TROY and FEDERAL AVOIRDUPOIS  
WEIGHT exchanged.

Q. What is the Rule?

Mult. Div.

RULE. Change pounds *vulg.* Troy, by 144 175

Ounces *ditto* by 24 35

Penny weights into drams 12 35

Grains into drams 1 70

Change pounds *fed.* Avoird. 175 144

Ounces into ounces 35 24

Drams into grains 70 1

### EXAMPLES.

Change 100 *lb. vulg.* Troy into *fed.* Avoirdupois weight.

$100 \times 144 = 14400$  *lb. oz. dr.*

175)14400(82. 2. 8 Ans.

400

500

1500

(100)

Change 100 *lb. federal* Avoirdupois into *vulgar* Troy weight.

$$100 \times 175 = 17500 \text{ lb. ex dw. gr.}$$

$$144 \overline{) 17500} (121 \text{ } 6 \text{ } 6 \text{ } 16$$

$$\underline{310}$$

$$\underline{220}$$

$$\underline{76}$$

$$\times 12 \text{ \&c.}$$

NOTE. Apothecary weight is not particularly considered in this Lesson, because grains in the vulgar table are precisely of the value with those in the vulgar table of Troy weight.

### SECT. 7.

VULGAR & FEDERAL LIQUID MEASURE exchanged.

Q What is the Rule?

RULE. To change the former into the latter, reduce the given weight to gallons, which are the same in both tables—then point off the first right hand figure for gallons, the second for federal Barrels, and the rest, if any, are Hogheads.

2. To reverse the exchange—fill the denominations of Barrels and Gallons with Cyphers, if significant figures are wanting; you have, then, only to remove all the separating points, and the exchange is made.

#### EXAMPLES.

Change 15 Hhds. 1 Bar. 15 gallons and an half into federal Liquid Measure.

$$\begin{array}{r} 15 \\ \times 63 \\ \hline \end{array}$$

$$945 \text{ gall.}$$

$$1 \text{ Bar.} = 31 \frac{1}{2}$$

$$\text{Gall. } 15 \frac{1}{2}$$

$$\underline{\hspace{1cm}} \text{ Hhds. bar. gall.}$$

$$992 \text{ gall.} = 9 \text{ } 9 \text{ } 2 \text{ fed. liq. meas.}$$

Change 9 Hhds. 3 Bar. and 2 gallons federal, into vulgar liquid measure,



Hhds. bar. gal.

9. 9. 2 Hhds, bar. gal.

992 gal. = 5, 1, 15½ Vulg. Liq. mea. Anf.

=====

## L E S S O N VII.

Direct REDUCTION of Federal Money, and  
the other Federal Tables of *Mixed Quantities*.

**Q.** **W**HAT is the general Rule of direct Reduction in  
all the Federal Tables.

**RULE.** Remove the separating points, and read all  
the denominations, as one simple whole number.—  
This reduces the given quantity into the lowest de-  
nomination which it expresses—If a lower reduction  
be required, express the remaining denominations by  
annexing as many Cyphers.

EXAMPLES.

§ § //

Reduce 24.7.5.6 into Mills.

Anf. 24756 Mills

=====

Reduce § 24 into Dimes, Cents &amp; Mills

Anf. § 240

// 2400

/ 24000

=====

**Q.** What if any of the middle denominations in the  
given sum be wanting, as 5 Dollars and 5 Mills?

**A.** Fill each and all of the vacant denominations with  
Cyphers; thus § 5.00.5 and then reduce as before.

Viz. / 5005

=====

EXAMPLES OF DIRECT REDUCTION in the other FE-  
DERAL TABLES.

lb. oz. dw. gr.

Reduce 3. 7. 6. 5 into ounces, into penny weights  
and into grains.

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*lb. 3. 7. 6. 5 Ans.*

*oz. 37. 6. 5*

*dw. 376. 5*

*gr. 3765*

=====

*mw. C. lb. oz. dr.*

Reduce 6. 5. 43. 2. 1 into *cwt. pounds, oz. & dr.*

*Ans. C. 65. 43. 2. 1*

*lb. 65 43. 2. 1*

*oz. 65432. 1*

*dr. 654321*

=====

*lb. 3 3 3 gr.*

Reduce 3. 4. 0. 9. 2 into ounces, into *dr.* into *scr.* & [into grains.

*Ans. 34. 0. 9. 2*

*340. 9. 2*

*3409. 2*

*34092*

=====

*Hhds. B. gal. pts.*

Reduce 9. 9. 2. 5 into barrels, gallons, & points.

*Ans. 99. 2. 5*

*992. 5*

*9925*

=====

*G. gr. gr. dez. part.*

Reduce 3. 4. 5. 6 into all the lower denominations.

*Ans. 34. 5. 6*

*3. 45. 6 N.B. There is no direct Reduction*

*3456 nor Consolidation, in the Federal*

*tables of Cloth & of Dry Measure.*

## LESSON VIII.

Direct CONSOLIDATION of Federal Mixed Quantities.

Q. **W**HAT is the general Rule of operation?

RULE. From the highest given denomination, point off, figure by figure, as many figures upon the right

hand, as that denomination is below the denomination sought or required; and these figures thus pointed off will be the lower denominations in their just order.— If you omit *Dimes* in the Table of Federal Money, then point off two figures for *Cents*.

## EXAMPLES.

Consolidate 57564 Mills into all the higher denominations.

Ans. //5796.4

¥579.6.4

¥57.9.6.4

=====

This specimen is judged sufficient to exemplify the foregoing Rule; and also to supercede the necessity of stating any examples of direct Consolidation, in any of the other Federal tables, inasmuch as they are all upon the same principle, and performed in precisely the same method.

*Q. What is the reason or propriety of the foregoing rules of reducing and consolidating Federal quantities?*

*A.* Because the several denominations in each table stand connected by a decimal ratio; each denomination being a decimal integer of the next lower, and a decimal fraction of the next higher denomination.

## LESSON IX.

How to change the various Currencies of Pounds, Shillings and Pence, into Federal Money.

## I. STERLING MONEY.

**Q.** **H**OW do you reduce Sterling into Federal money?

**RULE.** If the given sum be Pounds only, multiply by 40, and divide by 9; the Quotient will be Dollars: if there be any Remainder, reduce it to the lower denominations by annexing Cyphers and dividing.

2. If the given sum consist of Pounds and Shillings, reduce it to Shillings, then double them and divide as before.



3. If there be Pounds, Shillings and Pence, reduce them to pence, and divide by 54, the number of pence in a Dollar.

EXAMPLES.

Reduce 36<sup>l</sup>. Sterling into Federal money.

$$\begin{array}{r} 36 \\ \times 40 \\ \hline 9) 1440 \\ \hline \text{Ans. } \$ 160 \\ \hline \hline \end{array}$$

Reduce £ 36,, 9 into Fed. money.  $\times 20$

$$\begin{array}{r} 729 \\ \times 2 \\ \hline 9) 1458 (162 \text{ Ans.} \\ \hline \hline \end{array}$$

Reduce £ 579,, 17,, 9 Ster. into Federal money.

$$\begin{array}{r} 579,, 17,, 9 \\ \times 20 \\ \hline 11597 \\ \times 12 \\ \hline \$ \\ 54) 139173 (2577.27.74. \\ \hline 311 \\ \hline 417 \\ \hline 393 \text{ \&c.} \\ \hline \text{\&c.} \end{array}$$

SECT. 2.

IRISH MONEY federalized.

Q. How do you reduce this currency into Federal money?

RULE. Reduce the whole sum to half pence, and divide by 117.

EXAMPLES.

Reduce £ 78,, 4,, 6 Irish, into Federal money.

$$\begin{array}{r} 78,, 4,, 6 \\ \times 20 \\ \hline 1564 \\ \times 12 \\ \hline 18774 \\ \times 2 \\ \hline 37548 \text{ Half pence.} \end{array} \quad \begin{array}{r} 117(37548 (\$ 320.92.3 \text{ Ans.} \\ \hline 244 \\ \hline 108.0 \\ \hline 27.0 \\ \hline 36.0 \\ \hline (9) \end{array}$$

## S E C T. 3.

HALIFAX MONEY *federalized.*Q. *How do you reduce this currency into Federal money?*

RULE. If the given sum be in pounds only, multiply by 4, and the product will be dollars.

If in shillings, divide by 5.

If in pence, divide by 60, and the quotients, in either case, will be dollars. The remainders, if any, reduce as in the former Sections, by annexing cyphers and continuing the division.

## EXAMPLES.

Reduce £45,,17,,9 Hal. into Federal money.

45,,17,,9

× 20

—

917

× 12

—

6)1101|3(183.55 *Ans.*  
=====

Reduce £68,,14 Hal. into Federal money.

68,,14

× 20

—

5)1374(

—

274.8 *Ans.*  
=====

## S E C T. 4.

SOUTH CAROLINA & GEORGIA Currency *federalized.*Q. *What is the Rule?*

RULE. If the given sum be pounds only, multiply by 30, and divide the product by 7: the quotient will be dollars.

If there be shillings, or shillings and pence, reduce the whole to pence, and divide by 56: the quotient will be dollars.

## EXAMPLES.

Reduce £349 S. Car. &amp;c. cur. into Fed. money.

349

× 30

—

7)10470(

1495. 71.4 *Ans.*  
=====

Reduce £765,,3,,9 S.C. &amp;c. cur. into Fed. money.

£

15303

× 12

56)183645(3279.37.5 *A.*  
=====

SECT. 5.

NEW-HAMPSHIRE, MASSACHUSETTS, CONNECTICUT, RHODE-ISLAND, VIRGINIA, VERMONT and KENTUCKY currency, federalized.

Q. *How do you change this currency into federal money?*

RULE. If the sum consist of pounds only, annex a cypher and divide by 3, and if one remains it is // 33.8; if two it is // 66.6.

If there be pounds, shillings and pence, divide the pounds by 3; take the remainder and the shillings in the given sum, in shillings; divide them by 6, and annex the quotient figure to the quotient of the pounds, for dollars, the value of the remaining shillings and pence, if any, find by the table in the appendix.

EXAMPLES.

Reduce £ 157 N. E.  
into Federal money.

$$\begin{array}{r} 3)1570( \\ \hline \end{array}$$

$$\begin{array}{r} \$ 523.33.3 \\ \hline \hline \hline \end{array}$$

Reduce £ 575..17..8

$$3)575(1919.61 \text{ Ans.}$$

$$\begin{array}{r} \hline \hline \hline \hline \\ 6) 57( \\ \hline \end{array}$$

Remaining 3/8 = // 61

DECIMAL RULE\*.

Set down the shillings, pence, &c. in decimals of a pound; annex the left hand decimal figure to the pounds, and divide by 3, the quotient will be the federal money value complete.

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\* The decimal rule of Commutation in this, and several of the other currencies, is of all others, the easiest and best for the practitioner, as it supersedes the use of a table for the smaller denominations. It is therefore hoped that the irregularity of anticipating decimal operations in this part of the work will be excused; as the learner may pass over them, until he has first obtained a competent knowledge of decimal Arithmetic.



## COMMUTATION.

## EXAMPLES.

Reduce £ 575., 17., 8 L.M. of N. E. into federal money.

$$17/8 = .883 \text{ therefore}$$

$$3)5758.83($$

$$\text{\text{£}} 1919.61 \text{ Ans.}$$

## S E C T. 6.

NEW-JERSEY, PENNSYLVANIA, DELAWARE & MARYLAND CURRENCY, *federalised*.

Q. *What is the Rule?*

RULE. If there be pounds only, multiply them by 8 and divide the product by 3; the quotient will be dollars.

If there be shillings, or shillings and pence, reduce the whole to pence, annex a cypher and divide by 9, the quotient will be cents; therefore point off the two right hand figures for cents, and the rest will be dollars.

## EXAMPLES.

Reduce £ 345 N. J. currency into Fed. money. J. cur. Reduce £ 534., 9., 11 N.

$$345$$

$$\times 8$$

$$3)2760($$

$$\text{\text{£}} 920 \text{ Ans.}$$

$$==$$

$$\times 80$$

$$10689$$

$$12$$

$$9)1282790($$

$$\text{\text{£}} 1425.32.2 \text{ Ans.}$$

$$=====$$

## DECIMAL RULE.

Take the given sum in pounds and decimals, multiply by 8 and divide by 3; the quotient will be federal money.

Reduce £ 534., 19., 11 N. J.

$$534.996$$

$$\times 8$$

$$3)4279.968$$

$$\text{\text{£}} 1426.65.6 \text{ Ans.}$$

SECT. 7.

NEW-YORK and NORTH-CAROLINA currency *fed.*

*Q. What is the Rule?*

**RULE.** If there be pounds only annex a cypher, and divide by 4, the quotient will be dollars; and if there be any remainder, (which will ever be 2) it is half a dollar, or 5 dimes.

If there be shillings and pence, divide the pounds as before without annexing a cypher; if there be any remainder it is pounds; reduce them to shillings, in your mind only, add them to the shillings in the given sum, and divide them by 8, annexing the quotient figure to the former quotient, for dollars. As to the remaining pence, you may either annex a cypher to them and divide by 96, for dimes and cents; or find their federal money value in the table.

EXAMPLES.

1 Reduce £450. N. Y. currency into Fed. money.      3. Reduce £692,,12,,6 N. Y. currency into Fed. money.

$$\begin{array}{r} 4)4500( \\ \hline \end{array}$$

£1125 *Ans.*

==

2 Reduce £575 into Federal money.      Or 96)54.0(==

$$\begin{array}{r} 4)5750 \\ \hline \end{array}$$

£1437.50 *Ans.*

=====

The remainder 2 being £5 or //50.

*Explanation of the 3d example.* Dividing 692 by 4, the quotient is 173 without any remainder. Next divide the 12s by 8 and the quotient figure 1 annex to 173, making £1731.

DECIMAL RULE.

The given sum expressed in pounds and decimals multiply by 2.5,—the product is federal money. Take the 1st and 3d examples in the last rule.

Reduce £450 N.Y. cur.

 $\times 2.5$  $\text{Ans. } \text{£}11250$ =====

Reduce £692,,12,,6 N.

Y. currency.

 $\text{£}692,,12,,6 = 692.625$  $\times 2.5$  $\text{Ans. } \text{£}1731.5625$ =====

## L E S S O N X.

How to change Federal money into the several Currencies of Pounds, Shillings and Pence.

## I. Into STERLING MONEY.

Q. **W**HAT is the Rule?

RULE. Multiply the given sum by 4.5 which reduces it to shillings and decimals; to change the decimals into pence, multiply them by 12, and from the product point off the same number of right hand figures; the figure or figures upon the left of the point will be pence.

## EXAMPLES.

Consolidate  $\text{£}183.55$   
into Sterling money.

 $183.55$  $\times 4.5$  $2\text{b}0)825.975$  $\times 12$  $\text{£}41,,5,,11.700$ =====Consolidate  $\text{£}247.44.5$  $\times 4.5$  $2\text{b}0)1113.5025$  $\times 12$  $\text{Ans. } \text{£}55,,13,,6.0300$ =====

## S E C T. 2.

## Into IRISH MONEY.

RULE. Multiply the given sum by 39 and divide the product by 160; the quotient will be in Irish money, in pounds and decimals.





## SECT. 4.

Into SOUTH-CAROLINA and GEORGIA currency.

Q. What is the Rule?

RULE. Multiply the given sum by 7, and divide the product by 30, the quotient will be pounds and decimals; change the decimals as in Section 2.

EXAMPLES.

Consol. \$1495.71.5 in-  
to S. C & Georg. cur.

$$\begin{array}{r} 1495.715 \\ \times 7 \\ \hline \end{array}$$

$$3|0)1047|0.005$$

$$\begin{array}{r} \text{£}349 \text{ Ans.} \\ \hline \hline \end{array}$$

Consol. 3279.37.5 in-  
to S. C. cur.  $\times 7$

$$3|0)2295|5.625$$

$$765.1875$$

$$\times 20$$

$$2|7500$$

$$\times 12$$

$$\text{Ans. £}765,3,9|0000$$

## SECT. 5.

Into NEW-HAMPSHIRE, MASSACHUSETTS, CONNECTICUT, RHODE-ISLAND, VIRGINIA, VERMONT & KENTUCKY currency.

Q. How do you change Federal money into the Lawful money of New-England?

RULE. Multiply the given sum by 6; then point off as many right hand figures from the product, as there were figures below dollars—the rest are shillings; the figures pointed off are decimals of a shilling, which commute into pence, as in Section 1.

EXAMPLES.

Consolidate \$523.33.4  
into L. M. of N. E.

$$\begin{array}{r} 523.334 \\ \times 6 \\ \hline \end{array}$$

$$2|0)314|0.004$$

$$\text{£}157 \text{ Ans.}$$

Change \$1919.61 into  
L. M. of N. E.

$$\begin{array}{r} 1919.61 \\ \times 6 \\ \hline \end{array}$$

$$2|0)1151|7.66$$

$$\times 12$$

$$\text{£}575,17,7.92 \text{ Ans.}$$

SECT. 6.

*Into the Currency of NEW-JERSEY, PENNSYLVANIA, DELAWARE and MARYLAND.*

*Q. What is the Rule?*

**RULE.** Multiply the given sum by 3, and divide the product by 8; the quotient will be pounds and decimals.

**EXAMPLES.**

Consolidate  $\text{\textsterling}920$  into the currency of N.J. &c.      Consol.  $\text{\textsterling}1425.32.3$  in- to N.J. &c.       $\times 3$

$$\begin{array}{r} 920 \\ \times 3 \\ \hline 8)2760( \\ \hline \text{\textsterling}345 \text{ Ans.} \\ \hline \hline \end{array}$$

$$\begin{array}{r} \hline 8)4275.969 \\ \hline \text{\textsterling}534.496 \\ \times 20 \\ \hline 9.920 \\ \times 12 \\ \hline \hline \end{array}$$

$\text{\textsterling}534.,9.,11.04 \text{ A.}$

SECT. 7.

*Into NEW-YORK and NORTH-CAROLINA Currency.*

*Q. What is the Rule of changing Federal Money into this Currency?*

**RULE.** Multiply the given sum by 8, and the product will be shillings, or shillings and decimals: commute them as in Section 1. Or,

Multiply the given sum by .4, and the product will be pounds, or pounds and decimals.

**EXAMPLES.**

Consolidate  $\text{\textsterling}1731.56.2$  into N. Y. &c. currency.

Or  $1731.562$   $\times 4$

$$\begin{array}{r} 1731.562 \\ \times 8 \\ \hline 2)13852.496 \\ \times 12 \\ \hline \text{\textsterling}692.,12.,5.952 \text{ Ans.} \\ \hline \hline \end{array}$$

$$\begin{array}{r} \hline 692.6248 \\ 20 \\ \hline 12.4960 \\ 12 \\ \hline \hline \end{array}$$

$\text{\textsterling}692.,12.,5.9520$



## L E S S O N X I.

How to change the Ratio of any number of Pence or Shillings upon the Pound, into the equivalent number of Cents upon the Dollar, and the reverse.

Q. **W**HAT is the Rule ?

RULE. 1. To change shillings upon the pound, multiply them by 5, and the product will be the equivalent number of cents upon the dollar.

2. To change pence upon the pound into the same ratio of cents upon the dollar, you have only to annex a cypher to the pence, and divide them by 24; the quotient will be the true number of cents.

RULE 2. To reverse the operation, or change cents upon the dollar into pence upon the pound, multiply the given number of cents into 24; then cut off the right hand figure of the product, and the rest are the number of pence sought.

The following Tables will shew the mutual proportions, viz.

1 Penny upon the Pound = // 0 . 4 upon the Dollar.		
2 ditto	ditto =	0 . 8 ditto
3 ditto	ditto =	1 . 25 ditto
4 ditto	ditto =	1 . 6 ditto
5 ditto	ditto =	2 . 1 ditto
6 ditto	ditto =	2 . 5 ditto
7 ditto	ditto =	2 . 9 ditto
8 ditto	ditto =	3 . 4 ditto
9 ditto	ditto =	3 . 75 ditto
10 ditto	ditto =	4 . 2 ditto
11 ditto	ditto =	4 . 6 ditto
12 ditto	ditto =	5 ditto

1 Cent upon the Dollar	=	f. 0, 2 $\frac{1}{4}$	upon the Pound.
2 ditto	ditto	=	0, 4 $\frac{1}{4}$ ditto
3 ditto	ditto	=	0, 7 ditto
4 ditto	ditto	=	0, 9 $\frac{1}{2}$ ditto
5 ditto	ditto	=	1, 0 ditto
6 ditto	ditto	=	1, 2 $\frac{1}{2}$ ditto
7 ditto	ditto	=	1, 4 $\frac{3}{4}$ ditto
8 ditto	ditto	=	1, 7 ditto
9 ditto	ditto	=	1, 9 $\frac{1}{2}$ ditto
10 ditto	ditto	=	2, 0 ditto

EXAMPLES.

1. Supposing a public tax to be levied of  $3d \frac{1}{2}$  upon the pound, what would the same ratio of assessment be, counting upon dollars?

$$3d \frac{1}{2} \times 10 = 35 //$$

$$24 \overline{) 35} \left( 1. 4 \frac{1}{4} \text{ Ans.} \right.$$

$$\underline{\quad} \quad \underline{\quad} \quad \underline{\quad}$$

$$110$$

2. A merchant made 33 per cent. advance upon the prime cost in the sale of his goods; how much did he advance upon the pound?

$$\begin{array}{r} 33 \\ \times 24 \\ \hline 12 \overline{) 79.2} \\ \hline \end{array}$$

$$6.6 = 6s 7 \frac{1}{2} \text{ Ans.}$$

3. A bankrupt's estate was divided among his creditors, at the average proportion of  $13s 4$  upon the pound; what proportion was that in Federal money?

*Ans. // 66.6 upon the Dollar.*

NOTE. The amounts are calculated by the same rules as those of Simple Interest, in the Third Part.

## LESSON XII.

How to apportion the Price of Avoirdupois Weight, (112 to the *Cwt.*) upon the same number of Hundreds in Federal Avoirdupois, or reckoning only 100*lb.* to the *Cwt.*

Q. **W**HAT is the Rule?

RULE. To the number of Dollars in the given price, annex the dimes and cents, or two cyphers if it consist only of dollars, and divide that number by 112: the quotient will be the answer. Or,

If there be two or more hundreds in the given weight, multiply the number of hundreds into the given price, increased as before, and divide by the whole number of pounds in the given weight of Vulgar Avoirdupois.

## EXAMPLES.

1. At 1 Dollar per *Cwt.* (vulg. Avoird.) what is the price of 1 *Cwt.* Federal Avoirdupois?

112)100.0(89.3 nearly. *Ans.*

1040

320

(96)

2. If a ton of iron cost  $\$100$  what is the price of 1000 *lb.* Fed. Avoird.?

1. Ton = 2240*lb.*)100000( 44.642 *Ans.*

10400

14400

9600

(640)



## LESSON XIII.

## TARE AND TRET.

**Q.** **W**HAT are we to understand by the terms, Tare, Tret, and Cloff?

*A.* Certain allowances made by merchants and tradesmen in selling their goods by weight., viz.

**TARE** is an allowance made to the buyer, for the weight of the box, barrel, or bag, &c. in which the purchased goods are contained, and is varied according to circumstances, being at so many pounds *per* box, &c. or at so much *per* Cwt. or at so much in the gross weight.

**TRET** is an allowance of 4*lb.* in every 104*lb.* for waste, dust, &c.

**CLOFF** is allowance of 3*lb.* upon every 3 Cwt.

**Q.** What are the distinctions of **GROSS**, **SUTTLE**, and **NEAT WEIGHT**?

*A.* **Gross weight**, means the whole weight both of the article of traffic, and the barrel, box, cask or chest in which it is contained, without any deduction.

**Suttle weight** is when part of the allowance is deducted from the gross, as when the Tare is taken out and the Tret remains to be deducted—or, when the Tare and Tret are subtracted, and the Cloff is still to come out.

**Neat weight**, is what remains after all allowances are deducted.

**Q.** How is the **Neat weight** found, when either one or all of the foregoing allowances are to be made?

**RULE.** Multiply the Tare, and the weight upon which it is predicated, or the number of chests, casks, &c. together, subtract the product from the gross weight and the remainder will be the neat weight required.

2. When Tret is allowed with Tare—Divide the Suttle by 26, the quotient is the Tret; subtract this from the suttle and the remainder is Neat.

3. When Tare, Tret and Cloff are allowed, subtract the Tare and Tret as before, and then divide the suttle by 168, and the quotient will be the Cloff, which subtract from the suttle, and the remainder will be the Neat.

## EXAMPLES.

In 15 barrels of flour, each weighing 2 Cwt. 1 qr. 14 lb. gross, Tare 12 lb. per barrel, what is the Neat weight, in each of the three aforementioned cases of allowances?

1. Tare deducted.

$$12 \times 15 = 180 \text{ lb. Cwt. qrs. lb.}$$

$$\text{Or Cwt. } 1, 2, 2 \quad 2, 1, 14 \text{ gross wt. of } 1 \text{ bl.}$$

$$\times \times 3 = 15$$

$$\text{Cwt. } 11, 3, 14$$

$$\times 3$$

$$35 \quad 2, 14 \text{ Gross wt. of the whole.}$$

$$- 1, 2, 2 \text{ Tare subtracted,}$$

$$\text{Ans. } 34, 0, 12 \text{ Neat.}$$

2. Tare & Tret deducted.

Cwt.

$$26) 34, 0, 12 \text{ Suttle.}$$

$$- 1, 1, 6, 14, 12 \text{ Tret subtracted,}$$

$$\text{Cwt. } 32, 3, 5, 1, 4 \text{ Neat.}$$

3. Tare, Tret & Cloff, allowed.

Cwt. qrs. lb.

$$32, 3, 5 - 3675 \text{ lb. Suttle.}$$

$$168) 3675 = 21, 14 \text{ Cloff subtracted,}$$

$$315$$

$$112) 3653, 2$$

$$147$$

$$\times 16 \text{ &c. Cwt. } 32, 2, 13, 2 \text{ Neat. Ans.}$$

NOTE. It is considered as needless to add any further examples under the foregoing Rule, as the same general principles apply in every case of the kind; and all, in fact, are wrought by the rules of Direct Proportion.

L E S S O N XIV.

Commutation between the Federal Troy weight of American, British, Portuguese, French and Spanish Gold, and Federal money.

1. AMERICAN, BRITISH, & PORTUGUESE Gold.

Q. HOW do you change the federal Troy weight of this standard Gold into federal money?

RULE. Remove all the separating points on the left of penny-weights, and pounds, ounces and penny-weights are dollars. Remove the point between grains and cents, and they are cents, in federal money.

If there are only pounds given, annex two cyphers. If ounces only, or pounds and ounces, annex 1 cypher, and they are reduced to dollars.

EXAMPLES.

What is the value, in Federal money, of 2lb. 3oz. 4dw. 5gr. of American, British, or Portuguese gold?

lb. oz. dw. gr. cts.	Reduce 5lb.	lb. oz.	Red. 3oz.
2. 3. 4. 5. 0	Ans. \$500	Red. 5. 6	Ans. \$30
	==	Ans. \$560	==
\$234.50 Ans.			

2 FRENCH and SPANISH Gold.

Q. How do you change the federal Troy weight of this gold into federal money?

RULE. 1. Take the given weight in grains, multi-



ply it by 985; from the product point off the four right hand figures, and the rest are dollars. Or,

RULE 2. Subtract the given weight from itself, placing the first left hand figure of the Subtrahend under the third from the left hand in the Substratum—from this remainder subtract one half of the given weight; the second remainder is the federal money value; set the point at the left hand of the figure standing directly under the unit figure of the grains in the given weight, which will separate the dollars and cents.

## EXAMPLES.

What is the federal money value of 3lb. 4oz. 5dw. 6gr. of French or Spanish gold?

$$\begin{array}{r} 3456 \\ \times 985 \\ \hline \end{array}$$

Or, 3456.. 1st subtr. or given wt.  
\*—3456 1st Subtrahend.

$$\begin{array}{r} \text{\$} 340\ 41.6\ 0 \text{ Ans.} \\ \hline \hline \hline \hline \hline \end{array}$$

342144. 1st Rem. & 2d Substr.  
—17280 Half the given wt. subtr.

$$\begin{array}{r} \text{\$} 340.41.60 \text{ Ans.} \\ \hline \hline \hline \hline \hline \end{array}$$

What is the federal value of 1lb. of French gold?

$$\begin{array}{r} 1000 \text{ grains.} \\ -985 \\ \hline \end{array}$$

Or, 1000.. 1st Subtra. or given wt.  
—1000 1st Subtrahend.

$$\begin{array}{r} \text{\$} 98.50\ 00 \text{ Ans.} \\ \hline \hline \hline \hline \hline \end{array}$$

99000 1st Rem. & 2d Substr.  
—500 Half the given wt. sub-  
[tracted.]

$$\text{\$} 98.50.0 \text{ Ans.}$$

NOTE. This last Example will tend to explain the principle of the 2d Rule, as it shews its operation to be in effect the same as that of multiplying the given weight by 985.

\* This operation may be still further shortened by the Rule of Combined Subtraction, in Part I, Lesson XVII, Case 1; setting the figures thus, viz.

$$\begin{array}{r} 3456.. \\ 3456\ } \\ 1728\ } \\ \hline \text{\$} 340.41.6 \end{array}$$

*Q. How do you reverse the foregoing operations, or find the weight, in federal Troy, of any sum of gold accounted in federal money?*

**RULE.** If it be American, British or Portuguese gold, point off, in the given sum, cents for cents, dimes for grains; the first right hand figure of the dollars for penny-weights, the second for ounces, and the rest, if any, are pounds.

EXAMPLES.

What is the weight of  $\$234.50$  in Federal Troy weight?

*Ans. lb. 2. 3. 4. 5*

=====

What is the weight of 500, of 560, and of 30%.

*Ans. 5lb. Ans. 5lb. 6oz. Ans. 3oz.*

*Q. How do you find the federal Troy weight of any sum of French or Spanish gold, accounted in fed. money?*

**RULE.** Take the given sum in mills, divide by 985, and the quotient will be penny-weights, federal Troy weight. If there be any remainder, annex a cypher, and divide again for grains and cents.

EXAMPLES.

What is the federal Troy weight of  $\$340.41.6$  in French gold?

$985)340416(dw. 345.6 = 3ld. 4oz. 5dw. 6gr. Ans.$

4491

5516

591.0

(0)

## LESSON XV.

Commutation between Vulgar Troy Weight  
and Federal Money.

Q. **W**HAT are the Rules?

RULE 1. To ascertain the value of the weight of any given quantity of coined gold (expressed in Vulg. Troy weight) in Federal money, *first*, reduce the given weight to Federal Troy weight, by the rule in Lesson VI, Sect. 4: *nextly*, into Federal money by the rules in the last Lesson.

RULE 2. To find the weight of any given sum of Federal money, in coined gold, *first*, change the sum into Federal Troy weight, by the rule in the last Lesson, and *next* into Vulg. Troy, by rule in Lesson VI, Sect. 4.

1. AMERICAN, BRITISH and PORTUGUESE Gold,  
into Federal money.

Reduce *lb.* 5, 3, 6, 1 into Fed. money.

$\times 12$

63

$\times 20$

1266

$\times 24$

27) 303850 (*lb.* 11.2.5.3.7 Fed. Troy.

23

§ 1125.37 *Ans.*

68 &c.



# COMMUTATION.

161

Reduce *lb.* 5,,1,,4,,9

× 12

61

× 20

1224

× 24

27)293850(10883.3

*lb.* 10.8.8.3.3 Fed. T.

⌘ 1088.33 *Anf.*

===

By Rule 2.

What is the Vulg. Troy  
weight of ⌘ 1125.37?

1125.37 is

*lb.* 11.2.5.3.7 or

*gr.* 11253.7 Fed. Troy.

× 27

10)30384|9.9

24)30385 or nearly.

20)126|5—1 *gr.*

12(63—6 *dw.*

*lb.* 5,,3,,6,,1 *Anf.*

=====

What is the Vulg. Troy  
weight of ⌘ 1088.34?

*gr.* 10883.4 Fed. Tr. wt.

× 27

24)29385|1.8

20)122|4—9 *gr.*

12)61—4 *dw.*

*Anf.* *lb.* 5,,1,,4,,9 Vulg. T.

=====

## COMMUTATION.

FRENCH and SPANISH Gold, by Rule 1.

What is the value of  
56322 grains, Vulg. Troy  
weight, of French gold,  
in Federal money?

$$\begin{array}{r} 56322 \times 10 \div 27 = 20860 \text{ gr.} \\ 20860 \dots [\text{Fed. l r.}] \end{array}$$

$$\begin{array}{r} 20860 \\ 10430 \end{array} \}$$

$$\begin{array}{r} \text{\$} 2054.71.0 \text{ Anf.} \\ \hline \hline \end{array}$$

What is the value, in  
Fed. money, of 5751 gr.  
(Vulg. Troy) French gold?

$$\begin{array}{r} 5751 \times 10 \div 27 = 2130 \text{ gr.} \\ 2130 \\ \times 985 \end{array}$$

$$\begin{array}{r} \text{\$} 209.80.510 \text{ Anf.} \\ \hline \hline \end{array}$$

The Reverse, by Rule 2d.

What is the vulgar Troy weight of  $\text{\$} 2054.71$ ?  
985) 2054710 (2086 dwts. Federal Troy.

$$\begin{array}{r} 8471 \\ \hline 5910 \\ \hline (0) \end{array}$$

$$\begin{array}{r} 2086 \\ \times 27 \\ \hline 56322 \text{ grs. Anf.} \\ \hline \hline \end{array}$$

What is the vulgar Troy weight of  $\text{\$} 209.80.5$ ?

$$985) 209805 ( 213$$

$$\begin{array}{r} \hline \times 27 \\ \hline 1280 \end{array}$$

$$\begin{array}{r} \hline 5751 \text{ grains. Anf.} \\ \hline \hline \end{array}$$

$$\begin{array}{r} 2955 \\ \hline (0) \end{array}$$

## LESSON XVI.

Exchange between the Weight of Foreign Gold and each of the currencies of Pounds, Shillings and Pence, which are used in the United States.

## SECT. I.

SOUTH-CAROLINA and GEORGIA Currency.

**Q.** **H**OW do you find the value of any given weight of British or Portuguese gold, in this currency?

**RULE.** Reduce the given weight to grains, and divide by 116; the quotient will be pounds in this currency.

*Reverse.*

**RULE.** Reduce the given sum to pence, then multiply by 29, and divide by 60; the quotient will be grains, Vulg. Troy.

## EXAMPLES.

What is the value, in S. Car. &c. currency, of 27lb. 5oz. 7dw. 8gr. of British or Portuguese gold?

	<i>£. s. d.</i>
lb. 27, 5, 7, 8	116) 158096 ( 1362, 17, 11 $\frac{5}{9}$
$\times 12$	<u>420</u>
<u>329</u>	<u>729</u>
$\times 20$	<u>336</u>
6587	<u>104</u>
$\times 24$	$\times 20 \text{ \&c.}$
<u>158096</u>	



## COMMUTATION.

What is the weight of £1362, 17, 11  $\frac{5}{29}$  S. Car. &c. currency, in British or Portuguese gold?

$$\begin{array}{r} 1362, 17, 11 \frac{5}{29} \\ \times 20 \\ \hline \end{array}$$

$$\begin{array}{r} 27257 \\ \times 12 \\ \hline \end{array}$$

$$327095 \frac{5}{29}$$

$$\begin{array}{r} 327095 \frac{5}{29}^* \\ \times 29 \\ \hline \end{array}$$

$$6109485760$$

$$24)158096 \text{ grains.}$$

$$20)658|7-8 \text{ gr.}$$

$$12)329-7 \text{ dw.}$$

$$\text{lb. } 27, 5, 7, 8 \text{ Ans.}$$

## FRENCH and SPANISH Gold.

RULE. Divide the whole number of grains in the given weight by 124; the quotient will be pounds S. C. &c.

*Reverse.*

RULE. Multiply the whole number of pence in the given sum by 31, and divide the product by 60; the quotient will be grains, Vulg. Troy.

## EXAMPLES.

What is the value of 158069 grs. of French or Spanish gold, in the currency of S. Car. &c.

$$124)158096(1274, 19, 4 \frac{8}{31}$$

$$340$$

$$929$$

$$616 \text{ \&c.}$$

What is the weight, in French and Spanish gold, of £1274, 19, 4  $\frac{8}{31}$  S. Car.  $\frac{8}{31}$  pence.

$$1274, 19, 4 \frac{8}{31} = 305992 \frac{8}{31}$$

$$\times 31$$

$$6109485760$$

$$\text{Ans. } 158096 \text{ gr.}$$

\* Multiplying  $\frac{5}{29}$  by 29, makes just 5; so that, in all cases of this kind, you have only to add in the Numerator, or upper number in the fraction.

S E C T. 2.

NEW-ENGLAND, &c. Currency.

*English and Portuguese Gold.*

RULE. Multiply pounds (weight) by 64; the quotient will be pounds currency.

An ounce being £ 5,, 6,, 8, therefore multiply this sum by the number of ounces.

A penny-weight being 5f4, multiply the number of penny-weights into this sum.

Multiply the grains into  $2\frac{1}{2}d$ , and add the several products together. Or

Divide the whole number of grains in the given weight by 90; the quotient will be pounds, N. E. currency.

*Reverse.*

RULE. Reduce pounds, or pounds and shillings, to shillings, cut off the right hand figure, and divide by 128; the quotient will be pounds weight: the figure so cut off, bring down to the last remainder. Or

Multiply the whole number of pence in the given sum by 3, and divide the product by 8; the quotient will be grains.

EXAMPLES.

What is the value of lb. 56,, 11,, 12,, 8 gr. in the L. M. of N. E.

lb. 56	£ 5,, 6,, 8	5f. 4	d. $2\frac{1}{2}$
× 64	× 11oz.	× 12dw.	× 8 gr.
-----	-----	-----	-----
£ 3584,, 00,, 0	58,, 13,, 4	3,, 4,, 0	1f8
58,, 13,, 4			
3,, 4,, 0			
1,, 8			
-----			
£ 3645,, 19,, 0	Ans.		
=====			

Or,  $lb. 56, 11, 12, 8 = 328136$  grains.

$9|0)328136$

3645

86

$\times 20 \text{ \&c.} = \underline{\underline{\underline{\underline{\pounds 3645, 19 \text{ Ans.}}}}}$

What is the weight of  $\pounds 3645, 19$  N. E. in British, &c. gold?

$3645, 19$

$\times 20$

128)72919(lb. 56, 11, 12, 8 Ans.

891

1239

$\times 12$

)148618(11

&c.

Or,  $\pounds 3645, 19 = 875028$  pence.

$\times 3$

8)2625084(

Ans. 328135 $\frac{1}{2}$  grains.

This lacks half a grain, because there was one ninth of a shilling remainder, in the second example.

FRENCH and SPANISH Gold.

RULE. Multiply the whole number of grains by 3, and divide the product by 274; the quotient will be pounds, N. E.

*Reverse.*

RULE. Multiply the whole number of pence by 137, and divide the product by 360; the quotient will be grains.



EXAMPLES.

What is the value in N. E. money, of 56lb. 11oz. 12dw. 8gr. Fr. or Sp. gold?  $\text{£}3592, 14, 7\frac{25}{137}$  N. E.?  
 328136 grains.  $862255\frac{25}{137}$  d.  
 $\times 3$   $\times 137$

274)981408(  
 Ans.  $\text{£}3592, 14, 7\frac{25}{137}$  360)11812896|0(328136  
 328136gr. = lb. 56. 11. 12, 8

SECT. 3.

NEW-JERSEY, &c. Currency.

*English and Portuguese Gold.*

Q. How do you find the value of English gold, in this currency?

RULE. Divide the whole number of grains by 72; the quotient will be pounds currency.

*Reverse.*

RULE. Multiply the whole number of pence by 3, and cut off the right hand figure of the product; the rest are grains.

EXAMPLES.

What is the value, in N. Jersey, &c. currency, of 328136 grs. British or Portuguese gold?

72)328136(4557, 8, 10 $\frac{2}{3}$  Ans.  
 =====

What is the weight of  $\text{£}4557, 8, 10\frac{2}{3}$  N. Jersey, &c. currency, in British, &c. gold?

$\text{£}4557, 8, 10\frac{2}{3} = 1093786\frac{2}{3}$  pence.

$\times 3$

328136|0

328136 grains = 56lb. 11oz. 12dw. 8gr. Ans.  
 =====

FRENCH and SPANISH Gold.

RULE. Multiply the whole number of grains in the given weight by 75, and divide the product by 26; the quotient will be pence.

## COMMUTATION.

*Reverse.*

**RULE.** Multiply the pence by 26, and divide the product by 75; the quotient is grains.

### EXAMPLES.

What is the value of 328136 grs. of French or Spanish gold, in N. Jersey, &c. currency?

328136  
X 75

× 75

26) 24610200

$$12 \overline{) 946546} \frac{4}{26}$$

20) 788718--10

£3943.18.10  $\frac{4}{26}$  An.

What is the weight, in French or Spanish gold, of £3943., 18., 10  $\frac{4}{26}$  N.J. cur.

$$946546\frac{4}{2}\frac{4}{6}d.$$

X 26

$(75) 24610200(328136$   
 $328136 \text{ gr.} = \text{lb. } 56, 11, 12, 8$

328136 gr. = lb. 56,, 11,, 12,, 8

S E C T. 4.

NEW-YORK and NORTH-CAROLINA Currencies.  
British and Portuguese Gold.

**RULE.** Annex a cypher to the whole number of grains, and divide by 675; the quotient will be pounds currency.

Reverse.

**RULE.** Multiply the whole number of pence by 9 and divide the product by 32; the quotient will be grains.

## EXAMPLES.

What is the value of  $328136 \text{ grs.}$ ?

$$675) 3281360 (4861, 5, 5\frac{7}{9}$$

5813

4136 &c.

What is the weight of  
£4816,,5,,5 $\frac{7}{9}$  N. Y. &c.  
in French or Span. gold?

Pence mult. by 9, produce

32) 105.00352 (328136 gr.

$= 56\text{lb. } 11\text{oz. } 12\text{dw. } 8\text{gr.}$

FRENCH and SPANISH Gold.

RULE. Annex a cypher to the whole number of grains in the given weight, and divide by 685; the quotient will be pounds, New-York, &c. currency.

*Reverse.*

RULE. Multiply the whole number of pence in the given sum by 137, and divide the product by 480; the quotient will be grains.

EXAMPLES.

What is the value of 328136 grs. in N. Y. &c. currency?  $\text{£ } 4790, 6, 1 \frac{79}{137}$   
 What is the weight of  $\text{£ } 4790, 6, 1 \frac{79}{137}$  N. York, currency, in Fr. or Sp. gold? 328136 grs. *Anf.*

L E S S O N XVII.

RECAPITULATION of all the foregoing Rules of Exchange, in one universal Rule, by the help of the following Tables.

TABLE 1.

Shewing the reciprocal proportions between all the different Currencies of Pounds, Shillings, &c. and Federal Money, respectively.

*Ster. S.C. Ir. Hal. N.F.N. 7. N.Y. Fed.*

<i>Federal.</i>	9 40	7 30	39 160	1 4	3 10	3 8	2 5	
<i>N. York, &amp;c.</i>	9 16	7 12	39 65	5 8	3 4	15 16		5 2
<i>N. Jer. &amp;c.</i>	3 5	28 45	13 20	2 3	4 5		16 15	8 3
<i>N. Eng. &amp;c.</i>	3 4	7 9	13 16	5 6		5 4	4 3	10 3
<i>Halifax.</i>	9 10	14 15	39 40		6 5	3 2	8 5	4 1
<i>Irish.</i>	12 13	112 117		40 39	16 13	20 13	64 39	160 39
<i>S. Carol. &amp;c.</i>	27 28		117 112	15 14	9 7	45 28	12 7	30 7
<i>Sterling.</i>		28 27	13 12	10 9	4 3	5 3	16 9	40 9



## COMMUTATION.

TABLE 2.

Shewing the reciprocal proportions between the several Tables of Weight.

	Avoirdupois weight.			Troy weight.					
	lb.	oz.	dr.	lb.	oz.	dw.	gr.		
Fed. Troy, or American wt.	lb.	27	216	3456	15	45	900	2700	
		70	35	35	32	8	8	1	
	oz.	27	108	1728	3	9	45	270	
		700	175	175	64	16	4	1	
	dw.	27	54	864	5	6	9	27	
		7000	875	875	640	160	8	1	
	gr.	27	27	432	3	9	9	27	
		70000	1375	4375	6400	1600	80	10	
	Fed. Avoirdupois.	lb.		16	256	175	175	875	7000
				1	1	144	12	3	1
		oz.	1	16	256	35	35	175	700
			10	10	10	288	24	6	1
dr.		1	16	64	7	7	35	70	
		100	100	25	576	48	12	1	
Troy weight.	lb.	144	2304	7373		12	240	5760	
		175	175	35		1	1	1	
	oz.	12	192	3072	1		20	480	
		175	175	175	12		1	1	
	dw.	3	48	768	1	1		24	
		875	875	875	240	20		1	
	gr.	1	2	32	1	1	1		
		7000	875	875	5760	480	24		
Avoird. weight.	lb.		16	256	175	175	875	7000	
			1	1	144	12	3	1	
	oz.	1		16	175	175	875	875	
		16		1	2304	192	48	2	
	dr.	1	1		35	175	875	875	
		256	16		7373	3072	768	32	

# COMMUTATION.

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<i>Fed. Troy, or American wt.</i>	<i>Fed. Avoirdupois</i>			<i>Fed. Troy, or American wt.</i>			
	<i>lb.</i>	<i>oz.</i>	<i>dr.</i>	<i>lb.</i>	<i>oz.</i>	<i>dw.</i>	<i>gr.</i>
<i>lb.</i>	27	27	270		10	100	1000
	70	7	7		1	1	1
<i>oz.</i>	27	27	27	1		10	100
	700	70	7	10		1	1
<i>dw.</i>	27	2	27	1	1		10
	7000	700	70	100	10		1
<i>gr.</i>	27	27	27	1	1	1	
	70000	7000	700	1000	100	10	
<i>Fed. Avoirdupois.</i>	<i>lb.</i>	10	00	70	700	7000	0000
		1	1	27	27	27	27
<i>oz.</i>	1		10	7	70	700	7000
	10		1	27	27	27	27
<i>dr.</i>	1	1		7	7	70	700
	100	10		270	27	27	27
<i>Troy weight.</i>	<i>lb.</i>	144	281	32	64	640	6400
		175	35	15	3	3	3
<i>oz.</i>	12	24	48	8	16	160	1600
	175	35	7	45	9	9	9
<i>dw.</i>	3	6	12	8	4	8	80
	87	175	35	900	45	9	9
<i>gr.</i>	1	1	1	1	1	1	10
	7000	700	70	2700	270	27	27
<i>Avoird. weight</i>	<i>lb.</i>		10	70	700	7000	70000
			1	27	27	27	27
<i>oz.</i>	1	10	00	35	175	875	4375
	16	16	16	216	108	54	27
<i>dr.</i>	1	10	25	3456	175	875	4375
	256	256	64	35	1728	864	432

NOTE. Read these two pages as one Table.

TABLE 3.  
Proportions between the weight of coined Gold and the several currencies of the United States,

Fed. S. Carolina and Geor.				N. England, &c.				N. Jersey, &c.				New-York, &c.			
money.	£.	f.	d.	£.	f.	d.	£.	f.	d.	£.	f.	d.	£.	f.	d.
lb.	640	1440	28800	345600	64	1280	15360	80	1600	1928	256	5120	20480		
oz.	160	120	2400	2880	16	320	1280	20	400	1600	64	1280	5120		
dw.	8	6	120	2400	4	16	64	2	20	80	16	64	256		
gr.	1	29	29	29	15	3	1	6	3	1	45	9	3		
	27	116	5	120	1	2	8	1	18	10	2	8	32		
			29	29	00	0	3	72	18	3	135	27	9		
French and Spanish Gold.				American, British and Portuguese Gold.											
lb.	137	137	34400	137	137	137	137	137	137	137	137	137	137		
oz.	2400	560	11200	134400	720	14400	172800	900	1800	216000	960	19200	230400		
dw.	137	137	137	137	137	137	137	137	137	137	137	137	137		
gr.	5	7	70	840	3	30	360	5	25	75	2	40	480		
	137	822	411	411	274	137	137	416	104	26	137	137	137		



Q. *How are the foregoing Tables to be applied?*

RULE. Look the particular currency or weight of the given sum or quantity, and the particular denomination in which it is taken, in the left hand column; next, the particular currency or weight into which it is to be changed, by the index at the top, and the check at their common angle of meeting contains their reciprocal proportion; then, multiply the given sum or quantity by the upper proportional number, and divide the product by the lower one; the quotient will be the answer sought.

EXAMPLES under each of the Tables.

1. Reduce £65, Irish money, into the currency of N. Jersey, &c.

*By the Table, the proportionals are found be 20 and 13.*

Therefore

$$\begin{array}{r} £65 \\ \times 20 \\ \hline \end{array}$$

$$13)1300(£100 \text{ N. Jersey, \&c. Ans.}$$

==

2. Reduce 578 drams, Avoird. into grains, Tr. wt.

*The tabular numbers are 875 and 32.*

$$\begin{array}{r} 578 \\ \times 875 \\ \hline \end{array}$$

$$32)505750(15804 \text{ Ans.}$$

==

$$\begin{array}{r} 185 \\ \hline \end{array}$$

$$\begin{array}{r} 257 \\ \hline \end{array}$$

$$\begin{array}{r} 150 \\ \hline \end{array}$$

$$(22)$$

3. What is the value, in pence, N. England, &c. currency, of 540 grains of British gold?

L 2

The tabular numbers are 8 and 3.

$$\begin{array}{r}
 540 \\
 \times 8 \\
 \hline
 3)4320 \\
 \hline
 1440 \text{ pence. } \textit{Ans.} \\
 \hline
 \hline
 \end{array}$$

## L E S S O N XVIII.

Miscellaneous Questions for exercise.

- W** 1. HAT is the Federal money value of £5725, 15, 6 Sterling money? *Ans.* \$25447.889
2. An Invoice of goods from Dublin amounts to £7572, 5. Required the sum in Federal money? *Ans.* \$31065.641
3. To what sum in S. Carolina and Georgia currency, will 4100 Federal dollars amount? *Ans.* £956, 13, 4
4. What sum in Federal money, equals £137, 18, 4 Halifax currency? *Ans.* \$751.664
5. To what sum in Federal money does the debt of Great Britain amount, estimated at £400 000 000 Sterling? *Ans.* \$1777777777.777
6. What is the weight of the last mentioned sum of dollars in English gold coin? *Ans.* 8333333lb. 4oz. Vulg. Troy.
7. What is the Avoirdupois weight of this sum of gold? *Ans.* 3061 Tons, 4Cwt. 1qr. 26lb. 13oz. 2dr.
8. How many cents upon the dollar is 3/6 upon the pound? *Ans.* // 17.5
9. What is the Federal money value of £268, 12, 8 N. England &c. currency? *Ans.* \$895.443
10. What number of dollars must I receive in lieu of £432, 15 N. Jersey, &c. currency? *Ans.* \$1154.

11. I bring my action against Jacobus Van Scheldt of the state of N. York, upon a note of hand given for £237, 12, for what sum must I declare in Federal money? *Ans. \$594*

12. A. exchanged with B. 132 bushels of Maize at 2/6 per bushel, for Wheat at 4/6 per bushel; how many bushels of Wheat must A. receive?

*Ans. 73 Bush. 1 peck, 2 qts. 1 pt.*

13. Giles Jackson, farmer, traded with Robert Howard and Co. merchants—delivered 25 bushels of flaxseed at // .88 7, 40 bushels of oats at // .50 3, and 10 bushels of potatoes at // 22; How many yards of cloth may he take up at \$2.82 per yard? *Ans. 39 yds.*

14. James Dawson exchanged rum with Job Fullerton, 185 gal. at \$1.75, for brandy at \$2.33 3—how many gallons must Dawson receive?

*Ans. 138 gal. 3 qts.*

15. J. Tucker exchanged with Jonathan Olmstead, 47 yards of cambric at \$1.52 6 per yd. for callicoos at \$1.32, and chintzes at \$1.52 6 per yard; how many yards must he have of each sort? *Ans. 31.5 yards.*

16. A land jobber purchased 1575 acres at 2/6 the acre; 3240 acres at 3/2; and 725 acres at 3/6; then sold the whole for 12/ per acre—what was the average advance upon the acre, and what the amount of his neat proceeds.

*Ans. 8/11 1/4 the average advance.*

*£2491, 5 Neat proceeds.*

17. A merchant bought wheat in Vermont for the N. York market, 5526 bushels at 12/ per bushel, expecting to sell it at 20/; but finding the market fast rising he stored it in the city with directions to his factor, not to sell it under 24/; the price arose to 23/10, and then suddenly fell to 8/. What did the merchant lose in his wheat, exclusive of the expence of transportation, storage, wastage, lying out of his property, &c.

*Ans. £1105, 4*

18. At the close of the American war, the Congress of the United States settled with the officers of the ar-



my, by commuting their half pay for life, theretofore promised them, into 5 years full pay in hand. Col. Broadsword received for his commutation money £628 N. England currency—What sum would he have received in Federal money, upon the other establishment, had he lived 30 years? *Ans.* \$6280.

19. John Thimbleton, a monied speculator, bought up old continental securities, in soldiers notes, to the amount of £10560, at the depreciated rate of 2s6 upon the pound. Afterwards, under the new Federal government, the credit of those securities was established at par. *Question.* How much was Mr. Thimbleton enriched at the expence of the war-worn veteran?

*Ans.* £9240

20. Daniel Buller borrowed of Jonathan Leason £51,17,6 Lawful money of N. England, to discharge himself from the custody of the officer, by whom he was held on execution. About 17 years afterwards, in the time of the American war, Mr. Buller sold a couple of yearling steers for that sum of money, in bills of public credit, or continental money, so called, at the time that it was depreciated 2000 per cent, and very cheerfully made a lawful tender of the money, in discharge of his debt to Leason. *Question.* How much ought honest Mr. Buller to have paid in continental money; what was the real value of what he paid; and what was the distance between good conscience and actual conduct?

*Ans.* The real value of what he paid was £2,16,10½. What he ought to have paid in continental money was 400 times as much, viz.

£1148,1,4

His gratitude to his friend, was, to cheat him of £49,0,7½ L. M. Or, £1096,3,10, Continental money.

## L E S S O N XIX.

The denominations of the Money of Account of various Foreign Nations, with their respective values in Federal money.

## FRANCE.

1 Denier	-	-	-	§ § /	=0.00.08
12 Deniers	=	1 Sol.	-	-	=0.00.95
20 Sols	=	1 Livre Tournois	-	-	=0.19.0

## SPAIN.

1 Marvedie	-	-	-	§ § /	=0.00.3
34 Marvedies	=	1 Real Plate	-	-	=0.10.0
10 Real Plate	=	1 Dollar	-	-	=1.00.0

## PORTUGAL.

1 Ree	-	-	-	§ § /	=0.00.124
10 Rees	=	1 Half Vintin	-	-	=0.01.24
10 Half Vintin	=	1 Testoon	-	-	=0.12.4
10 Testoons	=	1 Mill Ree	-	-	=1.24.0

## RUSSIA.

1 Muscoque	-	-	-	§ § /	=0.00.5
2 Muscoques	=	Copee	-	-	=0.01.0
10 Copees	=	1 Grievener	-	-	=0.10.0
10 Grieveners	=	1 Rouble	-	-	=1.00.0

## SWEDEN.

1 Runstick	-	-	-	§ § /	=0.00.52
32 Runsticks	=	1 Copper Dollar	-	-	=0.16.7
6 Copper Dollars	=	1 Rix Dollar	-	-	=1.00.0

## DENMARK.

1 Schilling	-	-	-	§ § /	=0.01.04
16 Schillings	=	1 Mark	-	-	=0.16.7
6 Marks	=	1 Rix Dollar	-	-	=1.00.0

## UNITED NETHERLANDS.

1 Penning	- - -	== 0.00.03
16 Pennings = 1 Stiver	- -	== 0.01.45
20 Stivers = 1 Guilder	-	== 0.39 0

## HAMBURGH.

1 Phenning	- - -	== 0.00.13
12 Phennings = 1 Schilling Lub.	-	== 0.02 1
16 Schillings Lub. = 1 Marc Banco	-	== 0.33 3

## CHINA.

1 Cash	- - -	== 0.00.148
10 Cash = 1 Cadarene	- -	== 0.01.48
10 Cadarenes = 1 Mace	-	== 0.14 8
10 Mace = 1 Tale	- -	== 1.48 0

## BENGAL.

1 Pice	- - -	== 0.00.32
12 Pices = 1 Anas	- -	== 0.03 9
16 Anas = 1 Rupee	- -	== 0.55 5

## INDIA.

1 Pice	- - -	== 0.00 7
8 Pices = 1 Fanam	- -	== 0.05 4
36 Fanams = 1 Pagoda	-	== 1.94 0

## L E S S O N XX.

## The Weights and Measures of different places.

## I WEIGHT.

One hundred pounds weight, of England, Scotland, Ireland, and America, amount to,	lb. oz.
At Geneva,	81,, 7
At Rouen, the viscounty weight,	88,, 0
At Frankfort and Nuremburgh,	89,, 7
At Rochelle,	90,, 9
At Amsterdam, Paris, Bourdeaux, &c.	91,, 8
At Hamburgh,	93,, 5
At Leipfic,	96,, 1



# COMMUTATION.

179

lb. oz.

At Liege,	96., 5
At Antwerp, or Brabant,	96., 8
At Seville, Cadiz, &c.	97., 0
At Portugal,	104., 13
At Lyons, the city weight,	106., 0
At Thoulouse, and upper Languedoc	107., 11
At Marseilles, and Provence,	113., 0
At Leghorn,	132., 11
At Genoa,	137., 4
At Venice,	152., 0
At Milan,	153., 11
At Naples,	154., 10

## 2. CLOTH MEASURE.

*One hundred yards of America, England, Scotland and Ireland, equal,*

Of France, England, Osnaburg & Geneva,	80 Ells.
Of Amsterdam, Haerlem, Leyden, } the Hague, Rotterdam, &c.	133 $\frac{1}{3}$ Ells.
Of Antwerp and Bruffels,	131 $\frac{2}{3}$ Ells.
Of Hamburg, Frankfort, Leipfic, } Bern, Basil, and Cologne,	160 Ells.
Of Breslau, in Silesia,	166 $\frac{3}{5}$ Ells.
Of Dantzick,	150 Ells.
Of Bergen and Drontheim,	146 $\frac{2}{3}$ Ells.
Of Sweden or Stockholm,	154 Ells.
Of St. Gall for Linen,	114 $\frac{2}{3}$ Ells.
————— for Cloth,	149 $\frac{1}{3}$ Ells.
Of Marseilles and Montpelier,	46 $\frac{2}{3}$ Canes.
Of Thoulouse and Upper Languedoc,	50 Canes.
Of Genoa,	40 $\frac{2}{3}$ Canes.
Of Rome,	44 Canes.
Of Castile and Biscay,	107 Vares.
Of Cadiz and Andalusia,	109 $\frac{1}{5}$ Vares.
Of Portugal or Lisbon,	81 $\frac{1}{3}$ Vares.
Of Portugal or Lisbon,	133 $\frac{1}{3}$ Covedos.
Of Venice,	126 Brasses.

Of Bergamo, &c.	104 $\frac{1}{3}$ Brasses.
Of Florence and Leghorn,	154 $\frac{1}{4}$ Brasses.
Of Milan,	171 $\frac{1}{5}$ Brasses.

## 3. DRY MEASURE.

*Eighty-two American or Winchester Bushels equal at*

Aiguillon 41 Sacks,
Albi 25 Setiers,
Alicant 12 Cahizes,
Alkmaar 36 Sacks,
Amersfort 16 Muddes,
Amsterdam 27 Muddles, or 1 Last,
Antwerp 32 $\frac{1}{2}$ Veertels,
Arles 49 Setiers,
Bayonne 36 Sacks,
Beaucaire 28 Setiers,
Beaumont 36 Sacks,
Bergen-op-Zoom, 63 Sisters,
Bois-le-Duc, 20 $\frac{1}{2}$ Mouwers,
Bommel 18 Muddes,
Bourdeaux 38 Boisseau,
Breda 33 Veertels,
Bruges 17 $\frac{1}{2}$ Hoedts,
Brussels 25 Sacks,
Bueren 21 Muddes,
Cadillac 33 $\frac{1}{3}$ Sacks,
Cadiz 52 Hanegas,
Cahors 100 Cartes,
Campan 24 $\frac{1}{2}$ Mudd,
Carcassone 35 Setiers,
Clairac 34 $\frac{1}{2}$ Sacks,
Cleves 16 $\frac{1}{4}$ Mouwers,
Condom 41 Sacks,
Coningsberg 1 Last,
Copenhagen 42 Tuns,
Dantzick 1 Last,
Delf 29 Sacks,
Deventer 36 Muddes,

Doesborough 22 Mouwers,  
Dort, or Dordrecht 24 Sacks,  
Dunkirk 18 Razieres,  
Edam 27 Muddes,  
Elling 1 Last,  
Embden  $15\frac{1}{4}$  Tuns,  
Erfelsteyn 21 Muddes,  
Franckfort 27 Malders,  
Ghent 56 Halsters,  
Genoa 25 Mines,  
Gimond 20 Sacks,  
Graveline 22 Razieres,  
Haerlem 38 Sacks,  
Hamburgh  $\frac{1}{3}$ ths of a Last,  
Huesden  $17\frac{1}{4}$  Muddes,  
Hoorn, or Horn, 44 Sacks,  
Ireland 38 Bushels,  
La Brille 40 Sacks,  
La Reole 30 Sacks,  
Lavour 21 Setiers,  
Lisle in Flanders, 38 Razieres,  
Lisbon 216 Alquiers,  
Leghorn 40 Sacks,  
Lorrain 27 Muddes,  
Lubeck 95 Schepels,  
Middleborough  $48\frac{1}{2}$  Sacks,  
Montfort 21 Muddes,  
Paris 19 Setiers,  
Porto Port 180 Alquiers,  
Purmerent 27 Muddes,  
Rabastens 17 Setiers,  
Rhenen 20 Muddes,  
Ruremond 68 Schepels,  
Riga 46 Loopens,  
Rotterdam 29 Sacks,  
St. Giles 40 Charges,  
St. Omer  $22\frac{1}{2}$  Razieres,  
St. Valery 19 Setiers,



Saumur 19 Setiers,  
Steenbergen 35 Veertels,  
Stockholm 23 Tons,  
Terveer 39 Sacks,  
Thiel 21 Muddes,  
Thoulouse 26 Setiers,  
Tongres 15 Muddes,  
Tonnington 34 Tons,  
Venloo  $21\frac{3}{4}$  Mouwers,  
Vianden 20 Muddes,  
Utrecht 25 Muddes,  
Zurick Zee 40 Sacks.

*NOTE. For the operation of exchange between the different monies, weights and measures in the two last Lessons, apply the Rule of Three or the rules of Decimal Commutation, in the Third Part.*

END OF THE SECOND PART.



*The American Accomptant, &c.*

P A R T III.

DECIMAL PRACTICE.

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L E S S O N I.

GENERAL QUESTIONS.

Q. **W**HAT is meant by a Fraction?

A. A part or parts of an unit, and is so called in contradistinction to an integer or whole number.

Q. How many kinds of Arithmetical Fractions are there?

A. Two; Vulgar\* and Decimal Fractions.

Q. May not the same fractional part of an integer be expressed in either?

A. Yes.

Q. What is incidental to all fractions?

A. Two numbers; one called the numerator and the other the denominator. The former is always expressed; the latter is either expressed or understood.

*Explain them.*

The Numerator expresses the number of single parts

---

\* As the use of vulgar fractions may be advantageously superseded by that of decimals, they are viewed as an unnecessary branch of common school education, and therefore omitted in this Compendium.

contained in the fraction; the Denominator, the whole number of parts which compose the Integer. Thus  $\frac{4}{5}$  and  $.8$ , that is, four fifths and eight tenths: Here the first is a Vulgar, and the latter a Decimal fraction; the numbers 4 and 8 are numerators, and 5 and 10 their denominators. Increasing or diminishing the numerator has the like effect upon the value of the fraction, as nine tenths is more, and seven tenths less than eight tenths; but to increase the denominator lessens, and to diminish it, augments the fraction; four fourths being an integer, and four sixths less than four fifths.

*Q. In what respects do vulgar and decimal fractions differ?*

*A. Principally with respect to their notation, their denominators, their mode of operation, and their utility.*

In a vulgar fraction, the numerator and denominator are both noted, or written down, and the one set over the other: in decimals, the numerator only is expressed.

In vulgar fractions, the denominator may be any number whatever; in decimal fractions, the denominator is ever a decimal number, or unity, with one or more cyphers annexed.

Vulgar fractions admit of *improper* fractions, or fractions greater than an integer, such as  $\frac{8}{7}$ ; but decimals are always *proper* fractions, or less than an integer.

Their difference in mode of operation and utility, may be better understood by example and practice, than by any particular description.

## L E S S O N II.

### NOTATION of Decimal Fractions.

*Q. IN what respect does the Notation of decimals differ from that of whole numbers?*



A. 1. Decimal fractions are distinguished by a dot or point, (thus .) set at the left hand of the fractional number, which may be called the *Sinister* point. This is of great and necessary use in decimals, as it supplies the place of the denominator, and designates the magnitude of the fraction. As it divides the fraction from the integral figures, it is termed the *Seperatrix*.

2. Decimal fractions decrease infinitely towards the right hand; whole numbers increase infinitely towards the left; both starting from unity as a fixed central point, according to the following

TABLE.

C Millions	X Millions	Millions	C Thousands	X Thousands	Thousands	Hundreds	Tens	Units	Tenth parts	Hundredth parts	Thous. parts	X Thous. parts	C Thous. parts	Millionth parts	X Millionth parts	C Millionth parts	
0	8	7	6	5	4	3	2	1	.	2	3	4	5	6	7	8	9

NOTE. The decimal places, counting from the point towards the right, are also called *Primes*, *Seconds*, *Thirds*, *Fourths*, &c.

Therefore it is evident, that,

3, The magnitude of a decimal fraction, compared with another, does not depend upon the number of its figures, but upon the value of its first left hand figure: for instance, a fraction beginning with any figure less than 9, such as, .8573024, &c. if extended to an infinite number of figures, will not equal .9

Q. How do you enumerate, so as to read a decimal fraction?

A. The numerator being expressed by the figures actually set down, enumerate and read them as you would the same figures in a whole number. To find the denominator, consider the sinister point as standing for 1,

and all the figures upon its right hand for so many cyphers; then, by the common method, enumerate and read them accordingly, which will give you the denominator of the fraction. Thus, the following fractions,  $.1$ ,  $.15$ ,  $.236$ ,  $.0001$ , by this rule are to be read, *one tenth, fifteen hundredths, two hundred and thirty six thousandths, one ten thousandth*; which, written in the manner of vulgar fractions, would stand,

$$\frac{1}{10}, \frac{15}{100}, \frac{236}{1000}, \frac{1}{10000}.$$

*Q. What is the effect of removing the sinister point?*

*A.* If you remove it towards the right hand, it multiplies the fraction by 10 at every figure; thus,  $.235$  being  $2.35$ , becomes two integers and thirty-five hundredths; remove it another figure, and it is  $23.5$ , twenty-three and five tenths: remove it another figure, which is the same as taking it away, and it becomes a simple whole number,  $235$ .

But removing the point towards the left hand has directly the contrary effect: It divides, and makes the quantity ten times the less at every figure it is removed; thus  $235$  becomes  $23.5$ ,  $2.35$ ,  $.235$ ,  $.0235$ , and so on.

*Q. What are the effects of cyphers at the right or the left hand of a decimal fraction?*

*A.* At the right hand they neither increase nor diminish its value; but place them upon the left hand of the fraction, and they make it ten times the less for every cypher so placed.

*Q. What is the reason of this?*

*A.* Because, in the first case, the numerator is increased just in the same proportion with the denominator, and  $.1$ , *one tenth*, becomes  $.10$ , *ten hundredths*; but in the other case the denominator only is increased, which diminishes the fraction, and makes  $.1$ , *one tenth*, no more than  $.01$ , *one hundredth*. Therefore,

Any two or more decimal fractions, however differing in their magnitude, may be expressed by an equal number of figures, and have the same common denomina-

ter. So these decimals, .8, .05, .456, .0003, may be written .8000, .0500, .4560, .0003.

*Q. How may a whole number be decimally expressed?*

*A.* By annexing one or more cyphers, separated by the sinister point—thus, 39.0, 24.000.

# LESSON III.

## Exercises in Decimal Notation.

**Q.** **H**OW do you read the following decimal fractions? which is the largest, and which the smallest of them?

.3	.51004	.889
.25	.020304	.000400405
.50	.0070060	.000060000
.499	.8880001	.99
.0621	.888999002	.0000000009

*Q. How do you write down in figures the following decimal fractions expressed in writing, viz.*

Five, hundredths.

Twenty-five, thousandths.

Three hundred and seventy-six, ten thousandths.

Six hundred and four thousand and seventy-one, millionths.

Twenty thousand, eight hundred and thirty-three, millionths.

One hundred and ninety-one, ten thousandths.

Six thousand, eight hundred and seventy-five, hundred thousandths.

Two thousand and eighty-three, millionths.

Forty-one thousand, six hundred and sixty-six, ten millionths.

Seven thousand and two, hundred thousandths.

Six thousand, six hundred and ninety-six, hundred millionths.

Twenty-seven thousand & nine, hundred thousandths.

Eight hundred and seventy-three, thousand millionths.

Forty-seven, hundred thousand millionths.



## LESSON IV.

## Decimal Points.

**Q.** **W**HAT other Decimal Points are used in this Compendium, and what are they called?

**A.** The *Dexter* point, the *Surdal* point, and the *Antifurdal* point.

*Explain them.*

1. The *Dexter* point, placed thus,  $\overset{\cdot}{5}$ , when applied to the dividend, according to the rules of division hereafter given, denotes that the figures upon its left hand will quotient integers, and those upon its right, fractions. It is also used in reducing a decimal fraction into its proper value, in the lower denominations of a vulgar table; and then it shews that the figures upon the left hand only are made use of, and those upon its right thrown away, being smaller than the ultimate fraction, or lowest denomination of that table.

2. The *Surdal* point is a colon, ( $:$ ). This is a sign of rejection: It is used in Division, in case the dividend cannot be exactly measured by the divisor; and being applied to the last remainder, (thus,  $537:$ ) denotes it to be a surd number, of no further account or use in the operation. It is also applied to any fraction or part of a fraction which is thrown away.

3. The *Antifurdal* point placed over a figure (thus  $\overset{\cdot}{5}$ ) denotes that figure to be read one larger than its nominal value. It is placed over the right hand quotient figure, to force a stop in division, where the remainder is such as would continue the division forever, without bringing out the fraction with perfect exactness.

It is also used in reducing decimals, for the same purpose as the *Dexter* point, where its right hand figure is as large as 5, or larger.

**Q.** May not the same number, sum, or quantity, be both an Integer and a Fraction?

*A.* Yes. This is ever the case with the middle denominations in mixed quantities. For instance a dime is a fraction of a dollar, and an integer of a cent and a mill. The highest denomination is never a fraction, and is called the *ultimate integer* : The lowest denomination is never an integer, and called the *ultimate fraction*. The intermediate denominations, are in relation to each other, integers or fractions, and, as such, may be called *mesne integers*, and *mesne fractions*.

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## L E S S O N V.

### A D D I T I O N of Decimals.

**Q.** **H**OW is the Addition of Decimals performed ?

*A.* 1. Place the sinister points in a perpendicular line, and the first left hand figure of each fraction in the next column, and so on.

2. Add the several numbers together, and set down their sum total just as in simple Addition of whole numbers.

3. Place the sinister point in the sum total, directly under those in the statement, and the left hand figure, or figures, will be integers; those upon the right, decimals.

**Q.** How is the Addition of Integers and Fractions performed ?

*A.* Place the fractions as before, the integers upon the left hand of the point; then add all together as whole numbers, and place the sinister point in the sum total as before.

#### E X A M P L E S in Fractions.

.4	.37	.375	.4592	.56843	.348659
.5	.25	.625	.2954	.73846	.648341
—	—	—	—	—	—
.9	.62	1...	.756	1.30680	.997...
==	==	==	==	==	==

.4	.54	.573	.2954	.34865	.986431
.7	.06	.052	.0008	.08437	.34128
.8	.3	.001	.0095	.92303	.5934
.2	.025	.06	.0524	.04395	.19
—	—	—	—	—	—
==	==	==	==	==	==

## EXAMPLES of Integers and Fractions.

£245.073	℥22.52 6	yds. 542.378
542.065	33.26 5	245.56
479.5	44.69 5	974.5
—	—	—
===	===	===

Busshels.	lb. oz. dw. gr.	Mwt. c. lb. oz. dr.
67.125	3.4 5 6	4.6 37 5 8
56.25	2.8 3 7	7.8 25 4 2
38.375	3.7 0 7	4.37 3 6
—	—	—
===	===	===

NOTE. Where, as in the foregoing examples, the right hand figure, or figures in the sum total are cyphers, it is needless to express them.

## LESSON VI.

## SUBTRACTION of Decimal Fractions.

Q. HOW is this Subtraction performed?

A. RULE. Set down the numbers as in Addition; placing the Substratum, or that fraction whose left figure is the larger, uppermost; then perform the subtraction as in whole numbers, and place the sinister point in the remainder, directly under that in the Subtrahend. When the Substratum and Subtrahend con-



list of unequal numbers of figures, you may represent right hand cyphers, by as many dots.

EXAMPLES.

$\begin{array}{r} .735 \\ .24 \\ \hline \\ = \end{array}$	$\begin{array}{r} .6 \dots \\ .57892 \\ \hline \\ = \end{array}$	$\begin{array}{r} .4562843 \\ .36 \dots \\ \hline \\ = \end{array}$	$\begin{array}{r} .004 \dots \\ .00032 \\ \hline \\ = \end{array}$
---	--	---	--

Of Integers and Fractions.

$\begin{array}{r} 532.45 \\ 421.34 \\ \hline \\ = \end{array}$	$\begin{array}{r} 235.43 \\ 159.54 \\ \hline \\ = \end{array}$	$\begin{array}{r} 857.6542 \\ 47.3456 \\ \hline \\ = \end{array}$	$\begin{array}{r} 35.1 \dots \\ 27.09 \\ \hline \\ = \end{array}$
--	--	---	---

Of the Federal Tables.

	lb. oz. dwt. gr.	Busshels.	Mwt. c. lb. oz. dr.
$\begin{array}{r} 33.26 \ 5 \\ 22.52 \ 6 \\ \hline \\ = \end{array}$	$\begin{array}{r} 3 \ 7 \ 0 \ 7 \\ 2 \ 8 \ 3 \ 7 \\ \hline \\ = \end{array}$	$\begin{array}{r} 13.25 \\ 9.75 \\ \hline \\ = \end{array}$	$\begin{array}{r} 7 \ 8 \ 25 \ 4 \ 2 \\ 4 \ 6 \ 37 \ 5 \ 8 \\ \hline \\ = \end{array}$

NOTE. For examples in the other Federal tables, see Part I, Lesson XVI.

LESSON VII.

MULTIPLICATION of Decimals.

Q. HOW do you multiply Decimal Fractions?

A. RULE. Multiply the factors together in the common method, whether they are pure or mixed fractions, as if they were whole numbers, or, which will be much shorter, by Cross Multiplication as in Part I, Lesson XX, and then place the sinister point in the product, as many figures from the right hand, as there

were decimal figures in both the factors ; and if there are not so many figures in the product, supply their deficiency by prefixing cyphers.

In multiplying together two mixed quantities, whether of the same, or of different tables, observe the following directions, viz.

1. In the thing bought or sold, make that denomination the integer, upon which the price is predicated.

2. Take that factor for the Multiplier which has the fewer figures.

3. If, in either factor, any or all the middle denominations are vacant, as in 3 dollars and 5 cents, or 4 pounds and 6 grains, then fill each vacant denomination with as many cyphers, as it will admit significant figures.

4. After you have fixed the sinister point in the product, count off from that towards the right hand, the lower denominations in their order, to the lowest denomination ; there, (in case there are figures still further towards the right) apply the dexter point ; but if the next figure be as large, or larger than 5, set the antifurdal point, and the remaining figures in either case are thrown away.

5. The product will belong to the same table with that of the price.

*Q. What do you observe that is still further distinguishing and curious in the multiplication of Fractions ?*

*A.* To multiply a fraction by a fraction, diminishes its value and makes the product less than either factor ; and to multiply an integer by a fraction invariably makes the product less than the multiplicand.

*Q. What is the reason of this ?*

*A.* It is because a fraction in its nature and operation is an exact contrast to an integer, having single unity for the middle term. Thus to multiply by 1, neither adds nor diminishes, but to multiply by any number more than 1 increases, therefore to multiply by any part, or parts less than unity or 1, of course dimi-

# MULTIPLICATION. 193

nishes; so that to multiply one half by one half, is the same thing as dividing it by 2, or halving it into a quarter.

EXAMPLES in pure Fractions.

1.	2.	3.	4.
.75	.537	.7354	.73542
$\times .5$	$\times .92$	$\times .867$	$\times .0007$
<hr/>	<hr/>	<hr/>	<hr/>
.375	.49404	.6375918	.000514794
<hr/>	<hr/>	<hr/>	<hr/>

In Integers & Fractions.

5.	6.	7.	8.
35.57	47.65	53.008	864.453
$\times .72$	$\times .003$	$\times .32$	$\times 468.354$
<hr/>	<hr/>	<hr/>	<hr/>
25.6104			
<hr/>			

In the Federal Tables.

9.	10.	11.
£ s d	lb. oz. dw. gr.	Mwt. c. lb. oz.
25.47 3	19.7 5 6	35.3 64 3
$\times .365$	$\times 48$	$\times 7.009$
<hr/>	<hr/>	<hr/>
9.29 7645:		
<hr/>		

12. What cost 17 lb. 6 3/4 of medicine, at //33 ¢ oz.?

$$3176.54 \times .33 = \$58.258 \text{ Ans.}$$

13. I contract with Ned Sawyer for 48968 feet of pine boards, at \$4.45 ¢ thousand feet: what must I pay him for the whole?

$$Td. 48.968 \times 4.45 = \$217.907 \text{ Ans.}$$

14. A merchant purchased 217.55 yards of Holland, at //75 ¢ yd. what is the amount of the whole?

$$217.55 \times .75 = \$163.165 \text{ Ans.}$$

N



15. I took Sampson Whiskey's note for 644 gallons of cider (*federal measure*) at  $\$5.50$   $\text{\textcircled{P}}$  hoghead: what was the sum of the note?

$$\text{Hhd. } 6.64 \times 5.5 = \$38.52 \text{ Ans.}$$

16. What is the worth of 65.625 bushels of flaxseed, at  $\$83 \frac{3}{4}$  bushel?

$$\text{Bush. } 65.625 \times 83.75 = \$54.66 \frac{5}{8} \text{ Ans.}$$

17. The farmer purchased of the bloomer 5 mwt. 3c. 25lb. of iron, and paid him in wheat, at the rate of 6.625 bushels  $\text{\textcircled{P}}$  cwt. what was the number of bushels paid?

$$\text{Cwt. } 53.25 \times 6.625 = \$353.03 \frac{1}{2} \text{ Ans.}$$

NOTE. The foregoing Examples in Decimal Multiplication, the author conceives, present a method of calculation more compendious in practice, and less puzzling in theory to the learner, than that of dividing by the aliquot parts of the given price, and by parts of a part, &c. with a different ratio for every different price, according to the method prescribed in the old complicated rule denominated Practice; and also to supersede the use of making several multipliers to bring out the total product of a composite number, in the rule commonly called Compound Multiplication.

## L E S S O N VII.

### DIVISION of Decimals.

Q. **H**OW do you place the parts in Decimal Division?

A. Just in the same order as in the Division of whole numbers?

Q. What is to be done with the last remainder?

A. Annex a cypher to it and continue the division, until you have exhausted the dividend, and completed the fraction in the quotient.

*Q. Where the dividend may be exactly measured by the divisor, what is the fraction called, arising from that division?*

*A. A terminate decimal.*

*Q. Is it not sometimes the case, that the last remainder is such a number as will not give the quotient fraction with perfect exactness; altho' you annex cyphers, and continue the division ever so long?*

*A. Yes; and such decimals, in contradistinction to the former, are called infinite or circulating decimals, and sometimes repeating decimals, because one or more figures always repeat, ad infinitum; as .666, .32573257, &c.*

*Q. How is such a decimal to be terminated?*

*A. It is unnecessary to protract the quotient to any greater number of figures, than what will contain the ultimate fraction sought; then force a stop by applying the surd point to the last remainder, denoting it thrown away; and if the number in the last remainder equals, or exceeds the one half of that expressed in the divisor, set the antisurd point over the last figure in the quotient.*

This method reduces the circulating, into a terminate decimal; and, tho' it does not ascertain the fraction with perfect exactness, yet the variation is so very inconsiderable, that what is wanting in exactness, is abundantly compensated in practical convenience.

*Q. What do you further remark as particular in the nature of Decimal Division?*

*A. That it is just the reverse of Whole Numbers, in that, dividing an integer by a fraction, or a fraction by a fraction, instead of diminishing, increases its value, or the quotient will ever be greater than the dividend.*

*Q. What is the method of dividing Decimal fractions\*?*

---

\* Division of decimals is the most complex of any of the fundamental rules in decimal Arithmetic, and, indeed, the

A. The general rule is to divide as in Whole Numbers, enlarging the number of the dividend, if necessary, by annexing one or more cyphers; then, in the question, count off as many decimal places, as the dividend has more than the divisor; and if there are not so many places in the quotient, supply the defect with left hand cyphers. For the greater ease, and clearer apprehension of the learner, this General Rule may be distributed into the several following Cases, in which all the various modifications of decimal numbers are pointed out, with a particular Rule directly applied to each.

---

*only one which is not perfectly simple and easy. The great difficulty is, to know, with precision, in what place to set the sinister point in the quotient. The General Rule is, indeed, just and extensive, and, to the man of figures well versed in the art, sufficiently clear and explicit. It is the young learner, however, who has that practical knowledge still to acquire, who needs the benefit of a written rule; and yet is benefited by it no further, and no faster, than he understands it, and becomes able to apply it. But, in the case before us, so diversified are the examples in decimal Division, by the different relations of the operating parts, the different modifications of the decimal numbers, and their different effects upon the value of the quotient, that it must be very difficult, if not impracticable, to state any one general rule, sufficiently definite to be at once clearly comprehended and easily applied by the young student. To remedy this inconvenience, the author is induced to vary from the common method, by analysing the General Rule, and classing the different cases which arise, under as many particular rules: these, being more simple, may be more easily applied; as the student, in any proposed example, will readily see under which Case it falls, and there find a familiar rule, explicitly in point.*



CASE 1.

*Decimals divided by Decimals.*

**RULE.** If the Divisor and Dividend are both decimals only, and the Dividend have the smaller number of decimal places, make them equal, by annexing one or more right hand cyphers. Then,

If the divisor be a smaller fraction than the dividend, or just equal to it, the quotient will be integers, until all the figures in the dividend are brought down; but, after you annex a cypher to the last remainder, all the subsequent quotient figures will be decimals. But,

If the divisor be the larger fraction, annex one or more cyphers to the dividend, until the number will contain the divisor, and the quotient will be only fractions.

EXAMPLES.

1.	2.	3.
Divide .75 by .3 $\begin{array}{r} .30 \overline{) .75} \quad (2.5 \\ \underline{.60} \phantom{0} \\ .150 \\ \underline{.150} \\ (0) \end{array}$	$\begin{array}{r} .8 \div .648 \\ .648 \overline{) .800} \quad (1.234 \\ \underline{.648} \phantom{0} \\ .1520 \\ \underline{.1296} \\ .2240 \\ \underline{.2240} \\ 368: \end{array}$	$\begin{array}{r} .648 \div .8 \\ .8 \overline{) .648} \\ \underline{.648} \\ 0 \end{array}$

CASE 2.

*Integers divided by larger Integers.*

**RULE.** When the divisor and dividend are both integers, and the dividend the smaller, annex a cypher or cyphers to the dividend, until it be large enough to divide, and prefix as many cyphers, save one, to the quotient,

## DIVISION.

## EXAMPLES.

$$\begin{array}{r} \text{4.} \\ \text{Divide } 225 \text{ by } 250 \\ 250 \overline{) 225.0(.9} \\ \underline{\phantom{00}0} \\ (0) \end{array}$$

$$\begin{array}{r} \text{5.} \\ \text{Divide } 5 \text{ by } 379 \dots \\ 379 \overline{) 5.00(.0131} \\ \underline{\phantom{00}0} \\ 121.0 \\ \underline{\phantom{00}0} \\ 73.0 \\ \underline{\phantom{00}0} \\ 351: \end{array}$$

## CASE 3.

*Decimals divided by Integers.*

**RULE.** When the Divisor is an Integer, and the dividend a Decimal, expressed by a smaller number, annex one or more cyphers to the dividend, and prefix as many left hand cyphers to the quotient, and if there were any left hand cyphers in the dividend, prefix as many more to the quotient; which will be a fraction, as much smaller than the dividend, as the divisor was larger.

## EXAMPLES.

$$\begin{array}{r} \text{6.} \\ \text{Divide } .7 \text{ by } 8 \\ 8 \overline{) .70(.0875} \\ \underline{\phantom{00}60} \\ 10 \\ \underline{\phantom{00}0} \\ 40 \\ \underline{\phantom{00}0} \\ (0) \end{array}$$

$$\begin{array}{r} \text{7.} \\ .66 \div 96 \\ 96 \overline{) .6600(.000625} \\ \underline{\phantom{00}240} \\ 420 \\ \underline{\phantom{00}0} \\ 480 \\ \underline{\phantom{00}0} \\ (0) \end{array}$$

$$\begin{array}{r} \text{8.} \\ .17 \div 680 \\ 680 \overline{) .1700(.0025} \\ \underline{\phantom{00}3400} \\ (0) \end{array}$$

## CASE 4.

*Decimals divided by Integers.*

**RULE.** If the Divisor be an Integer, and the dividend a Decimal, expressing a larger number than the divisor; place the first significant figure, in the quotient, as far from the sinister point, as the right hand figure of the first dividend is from its point.

## EXAMPLES.

9.	10.	11.
Divide .16 by 4	$.175 \div 90$	$.4 \div 1234$
$\begin{array}{r} 4 \overline{) .16} \text{ (}.04 \text{)} \\ 4 \overline{) .16} \text{ (}.04 \text{)} \\ \hline 00 \end{array}$	$\begin{array}{r} 90 \overline{) .175} \text{ (}.00194 \text{)} \\ 90 \overline{) .175} \text{ (}.00194 \text{)} \\ \hline 00 \end{array}$	$\begin{array}{r} 1234 \overline{) .4000} \text{ (}.000324 \text{)} \\ 1234 \overline{) .4000} \text{ (}.000324 \text{)} \\ \hline 0000 \end{array}$
$\begin{array}{r} 850 \\ \hline 400 \\ \hline 40: \end{array}$		$\begin{array}{r} 2980 \\ \hline 5120 \\ \hline 1184: \end{array}$

## CASE 5.

*Integers divided by Decimals.*

**RULE.** If the divisor be Decimals and the dividend Integers, annex, decimally, to the dividend, as many cyphers as there are figures in the divisor; and the quotient will be Integers, until all the dividend-figures are brought down.

## EXAMPLES.

12.	13.	14.
Divide 75 by .015	$659 \div .7$	$5 \div .375$
$\begin{array}{r} .015 \overline{) 75.000} \text{ (} 5000 \text{)} \\ .015 \overline{) 75.000} \text{ (} 5000 \text{)} \\ \hline 0000 \end{array}$	$\begin{array}{r} .7 \overline{) 659.0} \text{ (} 375 \text{)} \\ .7 \overline{) 659.0} \text{ (} 375 \text{)} \\ \hline 0000 \end{array}$	$\begin{array}{r} 375 \overline{) 5.000} \text{ (} 13.333 \text{)} \\ 375 \overline{) 5.000} \text{ (} 13.333 \text{)} \\ \hline 0000 \end{array}$
	$\begin{array}{r} 941.428 \\ \hline 1250 \\ \hline 1250: \end{array}$	

## CASE 6.

*Integers and Decimals divided by Decimals.*

**RULE.** If the divisor be Decimals only, and the dividend Integers and Decimals, then annex to the integers, by the *dexter* point, as many of the decimal figures as there are figures in the divisor, (thus, 72.345) and if there be not so many decimal places in the dividend, supply them with cyphers, (thus, 72.300) and the quotient, arising from all the figures upon the left of the dexter point, will be Integers,



## DIVISION.

## EXAMPLES.

15. Divide 168.81 by .3	16. 72.0003 ÷ .08	17. 9.68 ÷ .053
$.3 \overline{) 168.81} ($	$.08 \overline{) 72.0003} ($	$.053 \overline{) 9.680} (182.6$
<hr/> 562.7	<hr/> 900.00375	<hr/> 438

140

340

22:

## CASE 7.

*Decimals divided by Integers and Decimals.*

**RULE.** If the divisor be Integers and Decimals, and the dividend Decimals only, and expressing a larger number than the divisor, divide as in whole numbers, and the quotient will be decimals. But,

If the dividend be the smaller number, annex cyphers until you can divide, prefixing to the quotient as many cyphers, save one, as you annexed to the dividend.

## EXAMPLES.

18.  
Divide .6125 by 4.5

$$4.5 \overline{) .6125} (.136$$

162

275

5:

19.  
Divide .45 by 63.95

$$63.95 \overline{) .45000} (.007036$$

23500

43150

4780:

## CASE 8.

*Integers and Decimals divided by Integers.*

**RULE.** If the divisor be integers only, and the dividend Integers and Decimals; the quotient of the dividend integers will be integers, and those of the decimals, decimals. But,

If the Dividend Integers will not contain the divisor, annex a sufficient number of the decimal figures by the dexter point, prefixing to the quotient as many cyphers, save one, as there are figures between the dexter and finister point in the dividend.

EXAMPLES.

20.	21.	22.
Div. 9.6 by 3 $\begin{array}{r} 3 \overline{) 9.6} \\ \underline{3 \phantom{.0}} \\ 6 \phantom{.0} \\ \underline{6 \phantom{.0}} \\ 0 \end{array}$	$\begin{array}{r} 65 \div 75 \\ \underline{50} \\ 150 \\ \underline{150} \\ 0 \end{array}$	$\begin{array}{r} 1474.227 \div 54 \\ \underline{54 \overline{) 1474.227}} \\ 394 \\ \underline{394} \\ 162 \\ \underline{162} \\ 0 \end{array}$

CASE 9.

*Integers divided by Integers and Decimals.*

**RULE.** If the divisor be Integers and Decimals, and the dividend Integers only, and greater in value than the divisor, then annex to the dividend as many decimal cyphers, as there are decimal figures in the divisor, and the quotient will be integers, until the last figure in the dividend is brought down. But,

If the dividend be smaller in value than the divisor, annex only so many cyphers as will make it larger and then the quotient will be decimals.

EXAMPLES.

23	24.
Divide 810 by 32.4 $\begin{array}{r} 32.4 \overline{) 810.0} \\ \underline{324} \\ 486 \\ \underline{486} \\ 0 \end{array}$	Divide 54 by 432.8 $\begin{array}{r} 432.8 \overline{) 54.00} \\ \underline{4328} \\ 10720 \\ \underline{10720} \\ 0 \end{array}$

## D I V I S I O N.

## C A S E 10.

*Integers and Decimals, divided by Integers and Decimals.*

RULE. If the divisor and dividend both consist of Integers and Decimals, make the number of decimal figures equal in each; place the dexter point to the dividend, and the quotient will be integers: But, if the dividend does not contain the divisor, then annex to it a right hand cypher, and the quotient will be decimals.

## E X A M P L E S.

$$\begin{array}{r}
 \text{Divide } 75.3 \text{ by } 3.75 \\
 3.75 \overline{) 75.30} \quad (20.08 \\
 \underline{\phantom{00}3000} \\
 (c)
 \end{array}$$

$$\begin{array}{r}
 \text{Divide } 75.6 \text{ by } 151.2 \\
 151.2 \overline{) 75.60} \quad (.5 \\
 \underline{\phantom{00}0} \\
 (o)
 \end{array}$$

## C A S E 11.

*The Divisor an Integer and Decimal Denominator.*

RULE. When the divisor is an integer, and its number any Decimal Denominator, such as 10, 100, 1000, &c. whether the dividend be integers only, or integers and decimals, or decimals only, you have but to remove the sinister point as many figures towards the left hand as there are cyphers in the divisor.

## E X A M P L E S.

$$\begin{array}{rcl}
 \text{Divide } 10. \text{ by } 100. & 27. & 28. \\
 .1 \text{ Anf.} & 45.57 \div 10 & .39 \div 1000 \\
 & = 4.557 & = .00039
 \end{array}$$

## C A S E 12.

*The Divisor a Decimal, formed by a single Unit.*

RULE. If the divisor be a decimal made by a single unit, or an unit and any number of left hand cyphers, such as .1, .01, .001, &c. remove the sinister point in the dividend as many figures towards the right, as there are figures in the divisor; or annex as many cyphers, without the point, as the case may be.



# COMMUTATION.

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## EXAMPLES.

$$\begin{array}{lcl} \text{30.} & \text{31.} & \text{32.} \\ \text{Div. 10 by. 1} = 100 & 4.557 \div .01 = 455.7 & .00039 \div .001 \\ & & = .39 \end{array}$$

## PROMISCUOUS EXAMPLES.

	Dividend.	Divisor.	Quotient.
33)	135.62	$\div 4$	$= 33.905$
34)	74621	$\div .9$	$= 8291.2$
35)	39.255	$\div 367$	$= .1069$
36)	.7294	$\div 734$	$= .00099$
37)	4.98169	$\div 4.5$	$= 1.1077$
38)	.09875	$\div .984$	$= .10035$
39)	5.83	$\div 841.$	$= .006932$
40)	78	$\div .983$	$= 79.3489$
41)	72.8745	$\div 23$	$= 3.1684$
42)	28	$\div .007563$	$= 3702.23$
43)	56	$\div 70$	$= .8$
44)	.932	$\div 37.5$	$= .024853$
45)	.45	$\div 55.7$	$= .08969$
46)	480	$\div 27.3$	$= 17.58$

## LESSON VIII.

### COMMUTATION of Decimals.

**Q.** How do you change a vulgar into a decimal fraction?

**RULE.** Annex a cypher or cyphers to the numerator, and divide by the denominator; the quotient will be a decimal fraction of the same value.

## EXAMPLES.

Change  $\frac{3}{4}$   
4)3.0(.75

Change  $\frac{5}{10}$   
10)510(.25

Change  $\frac{3}{474}$  ..  
474)3.000(.00632

$$\begin{array}{r} 1560 \\ \hline 1380 \\ \hline \end{array}$$

432:

## LESSON IX.

## Of Mixed Quantities.

**Q.** **W**HAT is the General Rule of changing meſne or ultimate fractions into the decimal parts of a meſne or ultimate integer, in all the tables of mixed quantities?

**RULE.** The ſame as that in the laſt Leſſon, after expreſſing the given ſum or quantity in the form of a vulgar fraction, as thus, 18ſ is  $\frac{18}{20}$  of a pound; 6d. is  $\frac{6}{240}$  of a pound, and  $\frac{6}{12}$  of a ſhilling; 3 farthings are  $\frac{3}{4}$  of a penny,  $\frac{3}{48}$  of a Shilling, and  $\frac{3}{960}$  of a Pound.

## I. Of MONEY.

## EXAMPLES.

What are the decimal parts of a Pound in 18 Shillings.  $18\text{ſ} = \frac{18}{20}$  of a Pound. Therefore  $18 \div 20$

$$\begin{array}{r} 20 \overline{) 18.0} \end{array} \begin{array}{l} .9 \\ \text{ſ} \end{array}$$

What are the decimal parts of a Shilling and of a Pound in 6 Pence?

6d. =  $\frac{6}{12}$  of a Shilling, and  $\frac{6}{240}$  of a Pound.

$$\begin{array}{r} 12 \overline{) 6.0} \end{array} \begin{array}{l} .5 \\ \text{ſ} \end{array}$$

$$\begin{array}{r} 240 \overline{) 6.00} \end{array} \begin{array}{l} .025 \\ \text{ſ} \end{array}$$

What are the decimal parts of a Penny, of a Shilling, and of a Pound, in 3 Farthings?

$\frac{3}{4}$  Penny  $\frac{3}{48}$  Shilling  $\frac{3}{960}$  Pound.

$$\begin{array}{r} 4 \overline{) 3.0} \end{array} \begin{array}{l} .75 \\ \text{d.} \end{array}$$

$$\begin{array}{r} 48 \overline{) 3.00} \end{array} \begin{array}{l} .0625 \\ \text{ſ} \end{array}$$

$$\begin{array}{r} 960 \overline{) 3.000} \end{array} \begin{array}{l} .003125 \\ \text{ſ} \end{array}$$

120

240

(0)

1200

2400

4800

(0)

Therefore,			
Farthings.	Pence.	Shillings.	Pounds.
3	= .75	= .0625	= .003125
	6.0.	= .5...	= .025...
		18.0...	= .9.....
6 $\frac{3}{4}$	= 6.75	= .5625	= .028125
18f 6 $\frac{3}{4}$	=====	18.5625	= .928125
£ 1., 18., 6 $\frac{3}{4}$	=====		1.928125

S E C T. 2.

*Another method of changing Shillings, Pence and Farthings into an equivalent decimal of a Pound.*

RULE. 1. Write the given numbers perpendicularly under each other for dividends, inverting their order, or beginning with the smallest denomination.

2. Opposite to each dividend, in a left hand column, set the terminus of each for its divisor, with the sign of Division between them.

3. Divide the highest dividend by its terminus, and annex the quotient as decimal parts to the next lower dividend; proceeding with all the remaining dividends in the same manner; and the last quotient will be the equivalent decimal of the given sum.

Change 18f. 6d.  $\frac{3}{4}$ , into the decimal of a pound.

$$\begin{array}{r} 4) 3.00 \\ 12) 6.75 \\ 20) 18.5625 \end{array}$$

.928125 the decimal required.

Here, in dividing 3 by 4, I annex two cyphers, and the quotient is .75, which I annex to the 6d. This quotient, viz. 6.75, being pence and decimal parts of a penny, I divide by 12, and the quotient, .5625, I annex to the 18f. for decimal parts of a shilling. This quotient, divided by 20, gives the decimal sought.

S E C T. 3.

FEDERAL MONEY.

In federal money, no other Commutation is required, but only to read together all the lower denomina-



tions, as one aggregate decimal of that denomination proposed for the integer; prefixing cyphers, as the case may require, and setting the point accordingly. This will be sufficiently explained by the following

## SCALE.

*Consolidation.*

£ £ // /	//	£	£
1 =	.1 =	.01 =	.001
	1.0 =	.1 =	.01
		1.0 =	.1
1 1 =	1.1 =	.11 =	.011
1 1 1 =	11.1 =	1.11 =	.111
1 1 1 1 - - - -	- - - -	- - - -	1.111
1 0 1 1 - - - -	- - - -	- - - -	1.011
1 0 0 1 - - - -	- - - -	- - - -	1.001

*Reduction.*

£	£ //	// /	£ £ // /
1.001	- - - -	- - - -	1 0 0 1
1.011	- - - -	- - - -	1 0 1 1
1.111	- - - -	- - - -	1 1 1 1
.111 =	1.11 =	11.1 =	1 1 1
.011 =	0.11 =	1.1 =	0 1 1
.1 =	1.0 =	10.0 =	1 0 0
.01 - - - =	1.0 =	- - - -	0 1 0
.001 - - - -	- - - -	- - - -	0 0 1

## L E S S O N X.

The same.

**Q.** IS there not a shorter method of consolidating shillings, pence and farthings, into decimals?

**A.** Yes, by the following rules, viz.

**RULE. 1.** To change Shillings into decimals, halve them, and prefix the sinister point; thus, the decimal of 14s. is .7. If it be any odd number of shillings, halve them with a supposed cypher annexed; thus, 19s. is  $190 \div 2 = .95$ . For 1 shilling, prefix a cypher to the

half, or, in other words, put the significant decimal figure in the place of hundreds; thus,  $1s = .05$ : Or you may multiply any odd number of shillings by 5, for parts of a hundred.

2. To change Pence into decimals of a Pound, multiply them by 4, and the product will be thousandths; to which add 1 for every 24 it contains.

3. To change Farthings into decimals of a Pound, call every farthing .001: This falls short of perfect exactness, but immaterially.

## EXAMPLE.

Consolidate  $18/6\frac{1}{4}$ , into the decimal of a Pound.

$$\begin{aligned} 18 \div 2 &= .9 \\ 6 \times 4 + 1 &= .025 \\ 3 \times .001 &= .003 \end{aligned}$$

*£.928 the decimal required.*

This formal addition of the decimals, is only to make the example the more plain; but is unnecessary to the decimal practitioner; who may perform the addition in his mind only, and read the decimal merely by inspection. Let him but observe to add the third of the pence-decimal to the place of Hundreds, in that of Shillings, and the farthing-decimal to the place of Thousandths; and the operation is performed almost at a glance: Thus,  $18/6\frac{1}{4} = .928$ . In this case, he has only to take the half of 18, or 9, and annex to it the product of 4 times 6, with the addition of 1 for the 24 and 3 for the farthings, or 28, making .928.

*Q. What is the shorter method of writing pence and farthings in the decimal of their mesne integers?*

RULE. 1. To express pence in the decimal of a shilling, multiply them by 8, and add to the product 1 for every 3 in the given number, placing the sinister point. This, in 3d. 6d. and 9d. will be perfectly exact; in the others it will fall a trifle short; therefore it will be best to add 1 for 2d. 2 for 5d. 3 for 8d. and 4 for 11d.

2. To change Farthings into the decimal of a Shilling, multiply them by .021, and prefix a cypher: into the decimal of a Penny, by multiplying them into .25.

Change 9 pence into the decimal of a shilling.

$$\overbrace{9 \times 8} + 3 = .75 \text{ Ans.}$$

Change 3 farthings into the decimal of a shilling and of a Penny.

$$3 \times .021 = .063 \text{ Shilling.}$$

$$3 \times .25 = .75 \text{ Penny.}$$

## L E S S O N XI.

How to change the lower Denominations of the several Tables of Weights & Measures into Decimal parts of their respective Integers.

**Q.** IS there not another and shorter method of performing this operation, than by the General Rule, in Lesson IX?

**A.** Yes, by the medium of the following decimal Tables of weights and measures, concisely expressing the decimal of each lower denomination, in relation to all its integers, or higher denominations.

**RULE.** Multiply the number of each denomination in the given quantity, into that number which expresses the decimal of 1 of the same denomination and integer in the table, and add their products together, for the whole Decimal.



## 1. TROY-WEIGHT\*.

gr.	dw.	oz.	lb.
1	= .0417	= .0021	= .00018
1.	= .05	= .00416	
1.		= .083	

### EXAMPLES.

1. What are the decimal parts of a pound in 20 grains?  
*.00018 the decimal of 1 grain.*

$\times 20$

---

.00360

*Ans.* .0036

2. Change 9grs. 13grs. and 18grs. into their respective decimals of a Penny-weight.

*Ans.* 9gr.=.37, 13gr.=.54, 18gr.=.75.

Change 13 dw. 7 gr. into decimals of an ounce. *A.* .664

21 grs.	-	-	-	-	ditto	.0441
19 grs.	-	-	-	-	Penny weight,	.7923
20 grs.	-	-	-	-	Pound,	.0036
13 dwts.	-	-	-	-	ditto.	.054
17 dw. 3 gr.	-	-	-	-	ditto.	.70944
11 oz.	-	-	-	-	ditto.	.924
23 grs.	-	-	-	-	ditto.	.00414

---

\* Ounces Troy, may be changed into decimals of a Pound in the same manner as Pence into decimals of a Shilling. Penny-weights into decimals of a Pound wt. as Pence into decimals of a Pound currency: and into decimals of an Ounce by halving them like Shillings. Grains into decimals of an Ounce by doubling them, and adding to the product 1 for every 24 it contains, which will be parts of a thousand; into decimals of a Penny wt. by multiplying them into 4, and adding to the product one for every 24 it contains.

## COMMUTATION.

## SECT. 2.

## A VOIR DU POIS-WEIGHT.

oz.	lb.	qrs.	Cwt. *	Ton.
1	=.063	=.0023	=.0005	=.000025
1.	=.036	=.008	=.0005	
	1.	=.25	=.0125	
		1.	=.05.	

NOTE. Drams are omitted as too minute to be of any special account in common practice.

## EXAMPLES.

Answers.

Change 14 Cwt.	into the decimals of a Ton	=.7
ditto 2 qrs.	- - - ditto	=.025
ditto	- - - Hund.	=.5
2 lb	- - - Ton	=.0125
ditto	- - - Hund.	=.2
ditto	- - - Quarter	=.9
11 oz.	- - - Ton	=.000275
ditto	- - - Cwt.	=.0055
ditto	- - - Quarter	=.0253
ditto	- - - Pound	=.693
7 lb. 3 oz.	- - - Ton	=.003575
ditto	- - - Cwt.	=.0575
ditto	- - - Quarter	=.2589
3 qrs. 7 lb. 8 oz.	- - - Ton	=.0447
ditto	- - - Cwt.	=.89
16 Cwt. 1 qr. 27 lb. 15 oz.	Ton	=.814225

## SECT. 3.

## APOTHECARY-WEIGHT.

gr.	℥	ʒ	ʒ	lb.
1	= .05	= .016	= .002	= .00018
1.	= .33	= .041	= .0035	
	1.	= .125	= .001	
		1.	= .083	

\* Hundreds may be decimalized in the same manner as Shillings.

EXAMPLES.

Change	12 grs.	=			<i>Pound.</i>
	2 $\text{D}$	=			
	7 $\frac{3}{4}$	=			
	2 $\frac{3}{4}$	=			
	2 $\frac{3}{4}$ 7 $\frac{3}{4}$ 2 $\text{D}$ 12 gr.	=			
			into dec. of a	{	
				=	.00216
				=	.007
				=	.007
				=	.168
				=	.18716

SECT. 4.

LONG MEASURE.

A League is .05 of a Degree.

A Mile is .017 of a Degree, and  $\frac{33}{100}$  of a League.

A Furlong is .002 of a Degree, .041 of a League, and .125 of a Mile.

A Rod is .000052 of a Degree, .001 of a League, .003 of a Mile and .025 of a Furlong.

A Yard is .000015 of a Degree, .0003 of a League, .0009 of a Mile, .003125 of a Furlong, and .29 of a Rod.

A Foot is .0000125 of a Degree, .000025 of a League, .00018 of a Mile, .00151 of a Furlong, .06 of a Rod, and  $\frac{33}{100}$  of a Yard.

An Inch is .00000087 of a Degree, .0000052 of a League, .0000157 of a Mile, .000126 of a Furlong, .005 of a Rod, .028 of a Yard, and .084 of a Foot.

EXAMPLES.

*Answers.*

Change 7 Inches into the dec. of a League	=	.0000364
1 Foot and 7 Inches, -	ditto	= .0000614
3 yards, 1 foot, 7 inches	ditto	= .0009614
32 Rods, 3 yds. 1 foot, 7 inches	ditto	= .0329614
Furlongs, 6,, 32,, 3,, 1,, 7 inches	ditto	= .3369614
Miles, 2,, 6,, 32,, 3,, 1,, 7 inches	ditto	= .9549614



## COMMUTATION.

## SECT. 5.

## CLOTH-MEASURE.

*Nail. Quarter. Yard. Fl. Ell. Eng. Ell.*

$$1 = .25 = .0625 = .084 = .05$$

$$1. = .25 = .34 = .2$$

$$1. = 1.25 = .8$$

$$1. = .6$$

£ .75 of a yard.

## EXAMPLES.

Change 4 yds. 3 qrs. 2 na. into the dec. of an Eng. Ell.

$$4 \times .8 = 3.2$$

$$3 \times .2 = .6$$

$$2 \times .05 = .1$$

*Ans. 3.9 Eng. Ells.*

## SECT. 6.

## LAND MEASURE.

*Sq. foot. yd. Pole. Rood. Acre.*

$$1 = .11 = .00037 = .00001 = .00000229$$

$$1. = .034 = .0016 = .00038$$

$$1. = .025 = .0625$$

$$1. = .25$$

## EXAMPLES.

Change 6 feet into the decimal of a yard, = .67

3 yds. 6 feet. - - - Pole = .10416

1 Pole, 27 yds, 8 feet - - - ditto = .98896

1 Rood, 15 Poles, 12 yds. 7 feet, Rood = .39427

2 Roods, 25 Poles, 8 yds. 3 feet, Acre = .65929689

## SECT. 7.

## LIQUID MEASURE.

*Pt. qt. gall. bar. tierce. bhd. punch. pipe. tun.*

$$1 = .5 = .125 = .004 = .003 = .002 = .0015 = .001 = .0005$$

$$1. = .25 = .008 = .006 = .004 = .003 = .002 = .001$$

$$1. = .0318 = .024 = .016 = .012 = .008 = .004$$

$$1. = .75 = .5 = .375 = .25 = .125$$

$$1. = .67 = .5 = .334 = .167$$

$$1. = .75 = .5 = .25$$

$$1. = .667 = .334$$

$$1. = .5$$

EXAMPLES.

Change 19gal. 3qts. 2pts. into the dec. of a Bar. = .6352  
 1bar. 9gal. 3qts. 1pt. - - Tierce. = .987  
 1tierce, 1bar. 23gal. 3qts. - - Hhd. = 1.55  
 1hhd. 2 tierces, 13gall. 2qts. - Pun. = 1.412  
 1pun. 1hhd. 1tr. 1b. 1g. 1qt. - Pipe. = 1.764

SECT. 8.

DRY MEASURE.

Quart.	gallon.	peck.	bush. U. S.	bush. Can.
1	= .25	= .125	= .03125	= .025
1.	= .5	= .125	= .1	
	1.	= .25	= .2	
		.1	= .8	

EXAMPLES.

Change 3pecks, 1gal. 2qts. into the decimal of a bush.  
 U. S. - - - - = .9375  
 Ditto, - - - - bush. Can. .75

SECT. 9.

Of TIME\*.

Day.	Week.	Month.	Year.
1	= .14	= .034	= .003
1.	= .25	= .02	
	1.	= .083	

EXAMPLE.

What is the decimal of a year in 7 months, 3 weeks, and 3 days?

Months  $7 \times .083 = .581$

Weeks  $3 \times .02 = .06$

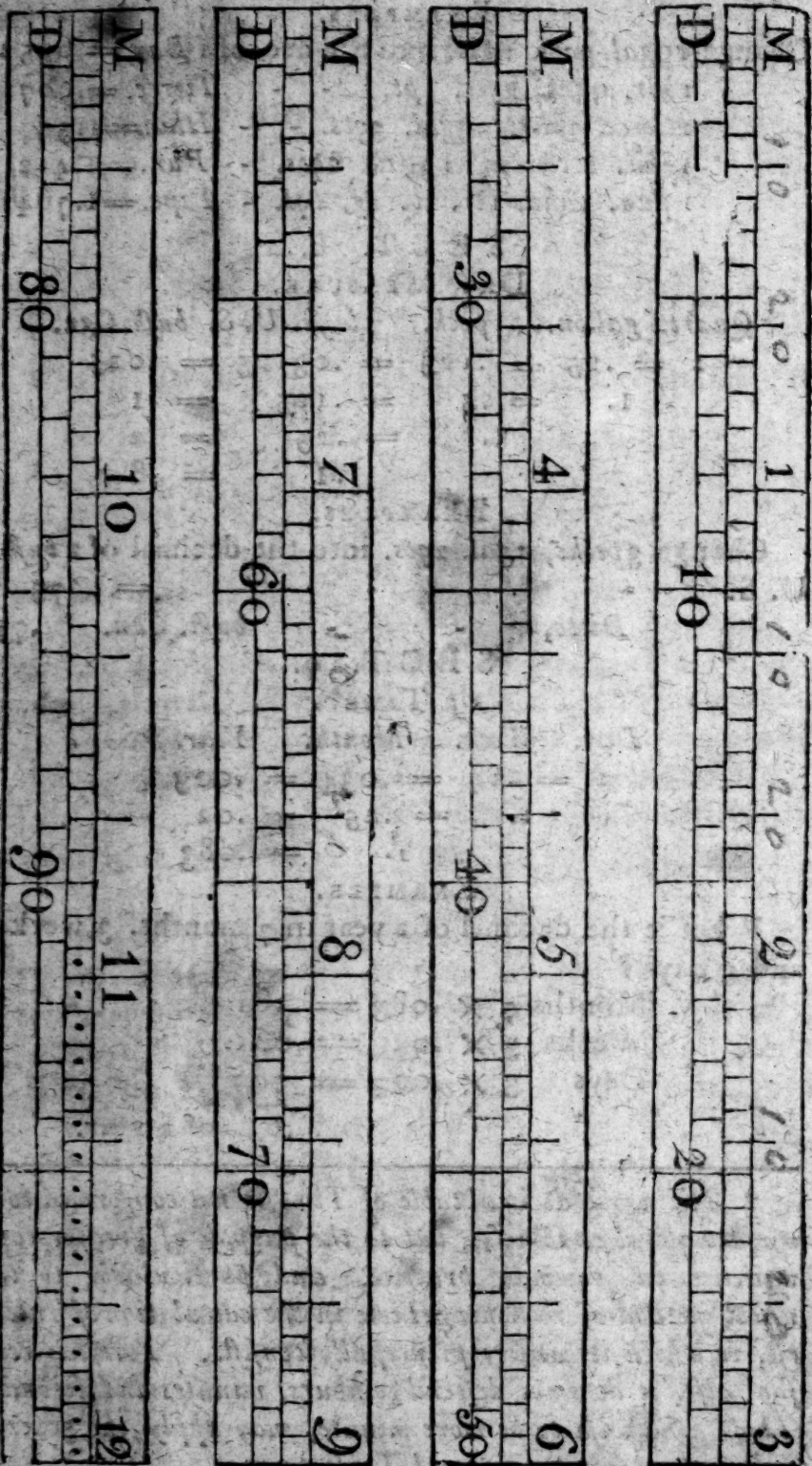
Days  $3 \times .003 = .009$

Anf. .65. of a year.

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\* The above decimal table of Time is not conformed to a mathematical exactness, but to the purpose of greater convenience in common practice, and particularly to the usual method of reckoning Time in the calculation of Interest, in which its utility principally consists. For this reason, also, it does not descend to hours, minutes and seconds. Those who wish to be more minute, may apply the general rule, or consult the decimal Table.

COMMUTATION.





To facilitate the art of decimalizing *Time*, the foregoing Scale is proposed, designed as an useful companion to the man of business, especially in the calculation of interest; as it will enable him to find the decimal of any requisite part of a year, merely by inspection, and in a decimal of only two places of figures.

*Explanation of the Scale.*

The Scale represents the period of 1 year divided into 100 equal parts; each space contains one quarter or .25 of a year. The space M divides the year into the 12 months and numbers them; the narrow space next below it subdivides the months into periods of two days; on the line D are marked the decimal parts of a year, having 100 for the integer or decimal denominator, and numbered at every ten. Therefore to find the decimal of any part of a year, find the given time upon the Scale, by the months and days; this being done take the mark standing directly, or the nearest under it, for the number of its decimal.

Apply the last example for a specimen.

Look 7 months and 24 days upon the Scale, and the decimal directly under it is .65, the same as before.

## L E S S O N XII.

### REDUCTION of Decimals.

**Q.** **W**HAT is the common and general rule of operation in reducing decimals of all the tables of mixed quantities?

**RULE.** Multiply the given decimal by the *terminus* of the denomination next lower than its integer; then point off from the product as many right hand figures as there were decimal figures in the multiplicand; the figures pointed off are so many of that denomination, of which the multiplier was the terminus, and the figures pointed off are decimals of that denomination, and must be multiplied by the next lower terminus, and so on, as before.

EXAMPLES in each Table.

Reduce .928125 of a pound to its equivalent value in shillings, pence, &amp;c.

$$\begin{array}{r} .928125 \\ \times 20 \\ \hline \end{array}$$

$$\begin{array}{r} S. 18.5625(00 \\ \times 12 \\ \hline \end{array}$$

$$\begin{array}{r} D. 6.75(00 \\ \times 4 \\ \hline \end{array}$$

Q. 3.00 Ans. 18s 6 $\frac{3}{4}$ 

2. Reduce .9877 of a pound Troy weight.

Ans. 11oz. 13dw. 1gr.

3 Reduce .913955 of a Ton.

Ans. 18Cwt. 1qr. 3lb. 4oz. 2dr.

4 Reduce .9549614 of a League.

M. fur. r. yds. f. in.

Ans. 2,, 6,, 36,, 4,, 0,, 7.

5 Reduce .572 of an English Ell.

Ans. 2qrs. 3nails.

6. Reduce .23916 of a pound (Apothecary weight.)

Ans. 23. 63. 20. 17gr.

7. Reduce .65929689 of an Acre.

Ans. 2Roods, 25P. 14yds. 7feet.

8. Reduce .987 of a Tierce.

Ans. 1bar. 10gal. 1pint.

9. Reduce .9375 of a Bushel U. S.

Ans. 3pecks. 1gal. 2qts.

10. Reduce .735 of a year.

Ans. 8mo. 3weeks, 2days.

## L E S S O N XIII.

Decimal Commutation of Money continued.

Q. **W**HAT shorter method is there of reducing the decimals of this Table?

**RULE.** If the integer be pounds, point off with the *dexter* point the three left hand figures, or with the *antifurdal* point, if the fourth be as large or larger than 5, then multiply them by 2, setting down the product of the left hand figure only, which is so many Shillings.

If this be an odd number, then subtract *five* from the second figure, and to the remainder annex the 3d figure, and after casting out 1 for every 25, divide by 4; the quotient will be pence and the remainder farthings. If the Shillings be an even number, then the *second* and *third* figures form a dividend as they stand. In this way the reduction may be performed merely by inspection.

## EXAMPLES.

1. Reduce .928·125 of a pound.

*Ans.*  $18/6\frac{1}{4}$  See the reverse, in page 205

2. Reduce .579 of a pound.

*Ans.* 11/7

*Explanation.*

Example 1. Take off the three left hand figures, 928, with the *dexter* point, the rest are thrown away: then say, twice 8 is 16—twice 2 is 4, and 1 is 5; then twice 9 is 18, which last product only I set down for shillings; that being an even number, I take the 2d and 3d figures as they stand, subtracting only 1 for the 25 which they contain, which leaves 27 for a dividend; this divided by 4, gives quotient 6 for pence, and remainder 3 for farthings.

Example 2.  $2 \times 9 = 18$ ;  $2 \times 7 = 14 + 1 = 15$ ;  $2 \times 5 = 10 + 1 = 11$ ; which I set down for shillings: this being an odd number, subtract 5 from the second figure 7, which leaves 2—the 9 annexed makes 29: 1 subtracted for the 25, leaves 28; this divided by 4, quotients 7 pence.

**NOTE.** If there be only two decimal figures, annex a right hand cypher; if there be but one, double it, and you have it in shillings.



## LESSON XIV.

A concise Decimal method of exchanging the several Currencies of Federal Money, and Pounds, Shillings and Pence.

**Q.** **H**OW do you apply the following Table, for the exchange of currencies?

**RULE.** After changing the parts of a Pound, if any, into decimals, look for the *currency* of the given sum at the left hand, and for *that* of the sum required, at the top: tracing from them, mark the decimal where their rows meet; then multiply by that tabular number, and the product will be the answer sought.

	<i>Sterl.</i>	<i>S. C.</i>	<i>Irish.</i>	<i>Hal.</i>	<i>N. E.</i>	<i>N. J.</i>	<i>N. Y.</i>	<i>Fed.</i>
<i>Federal.</i>	.225	.233	.244	.25	.3	.375	.4	
<i>N. York.</i>	.5625	.584	.609	.625	.75	.9375		2.5
<i>N. J. &amp;c.</i>	.6	.622	.65	.667	.8		1.007	2.667
<i>N. E. &amp;c.</i>	.75	.778	.8125	.834		1.25	1.334	3.334
<i>Halifax.</i>	.9	.934	.975		1.2	1.5	1.6	4
<i>Irish.</i>	.923	.957		1.003	1.23	1.538	1.641	4.003
<i>S. Car.</i>	.964		1.0446	1.007	1.286	1.607	1.714	4.286
<i>Sterling.</i>		1.004	1.084	1.112	1.334	1.667	1.778	4.447

## EXAMPLES.

Consolidate £133., 12, N. Jersey, &c. currency, into S. Carolina and Georgia currency.

$$\begin{array}{r} 133.6 \\ \text{Tabular number, } \times .622 \end{array}$$

$$\text{Ans. } 83.0992 = \text{£}83., 01., 11\frac{1}{4}.$$

Reduce £34., 7., 6 Halifax, into the currency of N. E.

$$\begin{array}{r} 34.375 \\ \text{Tabular number, } \times 1.2 \end{array}$$

$$\text{Ans. } 41.2500 = \text{£}41., 5.$$

Consolidate  $\text{₡}315.75$ , into the currency of N.Y., &c.  
 Tabular number,  $\times .4$

$$\text{₡}126.300 = \text{₡}126.6 \text{ Ans.}$$

For further examples, under this rule, the learner may turn back to Lessons V, IX and X, of the Second Part.

## L E S S O N X V.

Exchange between various foreign Monies  
 of account, and Federal Money.

**R**ULE. Look the federal money value of the money unit of the given foreign currency in Lesson XIX, Second Part; then, if the operation be Consolidation, multiply, if Reduction, divide by that decimal number, and the product or quotient is the answer required.

### EXAMPLES.

Change 5379 livres Tournois into federal money.  
 $\times .19$

$$\text{₡}680.01 \text{ Ans. } \$1022.01$$

**NOTE.** To reverse the exchange in this and all the following Examples, you have only to reverse the operation by the same decimal.

Change 574 millrees of Portugal into federal money.  
 $\times 1.24$

$$\text{₡}711.76 \text{ Ans.}$$

Change 1000 guilders into federal money.  
 $\times .39$

$$\text{₡}390.00 \text{ Ans.}$$

Change 1235 marcs banco of Hamburgh.

3)1235(

Ans. 411.66 7

Change 440 Chinese tales into federal money.

× 1.48

Ans. 651.20

Change 749 rupees of Bengal into federal money.

× .555

Ans. 415.695

Change 683 pagodas of India into federal money.

× 1.94

Ans. 1325.02

## LESSON XVI.

### PROPORTION.

**Q.** **W**HAT is the nature and effect of this rule?

There are ever three numbers, or terms given, by which to find a fourth. These numbers are either simple and expressed, or complex and involved in two or more factors, and bear relation to each other in a comparative proportion, as hereafter explained. Of these four terms, the first and second form an *Hypothesis* or Supposition, stating a certain *cause* as producing a certain *effect*—the third and fourth terms form a *Consequence* deduced from the second and third, inferring, as an answer to the question, a certain other cause or effect, corresponding in kind with that given in the Hypothesis.

**Q.** What are the general and common divisions of this Rule?



- A. 1. *Direct* Proportion, or Single Rule of Three.
  2. *Indirect* Proportion or Rule of Three inverse.
  3. *Compound* Proportion or Double Rule of Three.
- Give a concise explanation of each.

A. *Direct* proportion, is where the answer sought is the *effect* of a certain given cause in the Consequence, and is of the same kind with the 2d. term, or the effect stated in the Hypothesis; and bears the same proportion to it, as the cause in the Consequence does to the cause in the Hypothesis—or, the fourth term bears the same relation to the second, as the third does to the first. This is arguing from cause to effect, as, if 4 men eat 1 Bushel of wheat in a week, then 16 men will eat 4 Bushels in the same time. Which numbers may be thus divided and classed.

<i>Hypothesis.</i>		<i>Consequence.</i>	
<i>cause.</i>	<i>effect.</i>	<i>cause.</i>	<i>effect.</i>
4 men.	1 Bushel.	16 men.	4 Bushels.

2. *Indirect* Proportion, is when the answer required is the *cause* of the effect stated in the Consequence, and bears the same proportion to the second term, or the effect in the Hypothesis, as the first term, or cause in the Hypothesis, does to the third given term, or the effect in the Consequence. This is the reverse of the former, or reasoning from the effect to its cause; that is, if such a given effect be produced by such a particular cause, what cause is necessary to produce another certain given effect. *Example.* If  $\pounds$  100 in 12 months gain 6 *pr. cent.* interest,  $\pounds$  150 will gain the same sum in 8 months.

<i>Hypothesis.</i>		<i>Consequence.</i>	
<i>cause.</i>	<i>effect.</i>	<i>cause.</i>	<i>effect.</i>
$\pounds$ 100 in 12m.	6	$\pounds$ 150 in 8m.	6 interest

3. *Compound* Proportion, may be either *direct* or *indirect* and commonly consists of five numbers. It is where two of the given terms are complex and lie involved in the square of two or more given numbers, connecting with the cause or effect, some certain cir-

cumstance or quality, material to the question, and inseparable in its operation; such as, *the distance of goods carried—the number, quantity, weight &c. of any commodity bought or sold—the time of money lent, or advanced as stock in trade &c &c.* Example. If  $\text{£} 100$  at interest 10 months gain 5, what sum will 150 gain in 5 months? Here the cause in the Hypothesis is a complex term, consisting of 2 numbers, 100 and 10 months; and so also in the Consequence 150 and 5 months.

*Q. How are the given numbers to be prepared for the work, in every kind of Proportion?*

*A.* 1. Express the corresponding parts in numbers of the same name or denomination, and the fractional numbers, if any, in decimals.

2. Take that or those numbers which express the cause in the Hypothesis, and write them down in one line; then its effect, at a convenient distance towards the right hand, and draw a line from one to the other.

3. Place the terms of the Consequence in the same manner, each under its corresponding term, or number of the same name in the Hypothesis; supplying the vacant term or number with the letter *Q*, and then draw a transverse line from the effect in the Hypothesis to the cause in the Consequence, connecting the horizontal lines in the form of the letter *Z*.

*Q. What is the general Rule of operation in all kinds of Proportion?*

*A.* After stating the terms as above, then observe the following Rule, viz.

**RULE.** If the question or *Q* falls under the effect, it is Direct Proportion, if under cause it is Indirect Proportion—in the first case, multiply the number or numbers, if any, constituting the cause in the line of Consequence, with the number or numbers expressing the effect in the line of Hypothesis, at the other end of the cross line, for a *Dividend*; and all the other

numbers together for a Divisor. In the *second* case, multiply the first mentioned terms together for a divisor, and all the numbers standing at the other two corners for a Dividend; and the quotient, in either case, is the answer, or fourth term; and of the same name or denomination with the number standing above Q. See the illustration of the Rule in the following

EXAMPLES.

1. If  $4\frac{1}{2}$  yards of Broadcloth cost 18 Dallars what must I pay for 90 yards?

		<i>Cause..</i>	<i>Effect.</i>
Statement.	{	Hypothesis, 4.5 yds	18
		Consequence, 90	Q.

Operation  $Q. = 90 \times 18 \div 4.5 = 360$  ⌘

Here the Q falling under *effect*, the proportion is *direct*.

2. If 360 dollars purchase 90 yards of broadcloth, what is the price of 4.5 yards?

		<i>Cause.</i>	<i>Effect.</i>
Hyp. ⌘ 360	Z	90 yds.	
Con. Q.		4.5	

$Q. = 360 \times 4.5 \div 90 = 18$  ⌘. Ans.

Here the Q, falling under *cause*, denotes *Indirect* Proportion, and the number opposite it, (90) is, of course, the divisor. These two examples mutually prove each other; they may also be proved in another method, by this rule, *viz.* that the square of the two *extremes*, if the operation be true, will ever be equal to the square of the *mesnes*—that is, the product of the 1st and 4th terms, in the order they are stated, will be the same number as that of the 2d and 3d.

Proof. {  $4.5 \times 360 = 18 \times 90 = 1620$   
 $360 \times 4.5 = 90 \times 18 = 1620$

3. If ⌘100, at interest 10 months, gain 5, what will 150 gain in 5 months?



	<i>Cause.</i>		<i>Effect.</i>
Statement.	$\left\{ \begin{array}{l} \text{Hyp. } 100 \text{ for } 10 \text{ months,} \\ \text{Con. } 150 \quad \quad 5 \end{array} \right.$	Z	$\begin{array}{l} 5 \text{ int.} \\ \text{Q.} \end{array}$

Operation.  $150 \times 5 \times 5 \div 100 \times 10 = \pounds 3.75$  Ans.

Here the first and third term, being complex, the example is in Compound Proportion, while the place of the question denotes it to be *direct*.

Proof.  $100 \times 10 \times 3.75 = 150 \times 5 \times 5 = 3750$ .

4. If  $\pounds 150$  gain 3.75, in 5 months; what principal will gain  $\pounds 5$  interest in 10 months?

	<i>Cause.</i>		<i>Effect.</i>
Statement.	$\left\{ \begin{array}{l} \text{Hyp. } 150, 5 \text{ months,} \\ \text{Con. } \text{Q. } 10 \end{array} \right.$	Z	$\begin{array}{l} 3.75 \\ 5 \end{array}$

Operation.  $150 \times 5 \times 5 \div 10 \times 3.75 = \pounds 100$ . Ans.

Proof.  $150 \times 5 \times 5 = 100 \times 10 \times 3.75 = 3750$ .

Here the Q falling under *cause*, the rule of Indirect Proportion applies, and the 2d and 3d terms involve the divisor.

5. If 64 Canada bushels are equal to 80 bushels of the United States measure, and each of the former contains 40 quarts; how many quarts does the U. S. bushel contain?

	<i>Cause.</i>		<i>Effect.</i>
Statement.	$\left\{ \begin{array}{l} \text{Hyp. } 64 \text{ C.b. } 40 \text{ qts.} \\ \text{Con. } 80 \quad \quad \text{Q.} \end{array} \right.$	Z	$\begin{array}{l} \text{equal the whole*} \\ \text{equal the same.} \end{array}$

Operation.  $64 \times 40 \div 80 = 32 \text{ qts.}$  Ans.

6. If 8lb. of Hyson tea cost £3, 2, what will be the expence of 39lb.?

	<i>Cause.</i>		<i>Effect.</i>
Hyp. 8lb. causes the expence of		Z	£3.1
Con. 39lb.			Q. (how much?)

Ans. £15.1125 = 15, 2, 3.

---

\* Where the effects in both parts are the same, neither of them can be the object of inquiry, nor need to be expressed.

7. If £100, in 12 months, gain £6 interest; what principal will gain the same sum in 8 months?

*Cause.*

*Effect.*

*Hyp.* £100, in 12 months, **Z** a sum of interest.  
*Con.* Q. 8 the same sum.

*Ans.* £150.

8. If I pay my landlord  $\pounds 2.25$  for 1 week's board, what will be his bill for 30 weeks?

*Ans.*  $\pounds 67.50$ .

9. If a footman performs a journey in 3 days, when the days are 16 hours long; how many days of 12 hours length, will it require for him to perform the same journey?

*Ans.* 4 days.

10. If 27 grains of American gold be equal to 1 dollar, what is the worth of 1lb. 9oz. 8dw. 6gr.?

*Ans.*  $\pounds 380.66\ 6$ .

11. If 3lb. of standard gold be worth £256 of the currency of N.York; what is the weight of £1000?

*Ans.* 11lb. 8oz. 11d. 21gr.

12. How many yards of carpeting that is 1.5 yard wide, will cover a floor that is 18 feet wide and 30 feet long?

*Ans.* 60.

13. If 1 ton can be transported 40 miles for 5 dollars, how many cwt. may be carried 100 miles for 8 dollars?

*Ans.* 12cwt. 3qrs. 5lb.  $9\frac{3}{5}$ oz.

14. If 72 gallons of Brandy cost 111. dol. //60, what would 97.5 gall. cost?

*Ans.*  $\pounds 151.12\ 5$

15. How long must I lend my friend  $\pounds 123.45$  to requite his kindness in lending me  $\pounds 54.36$ , for 327 days.

*Ans.* 144 days.

16. If 82 bushels of the United States are equal to 19 setiers of Paris, how many setiers are contained in 410 bushels?

*Ans.* 95 setiers.

17. If 44 canes of Rome be equal to 100 yards of America; how many yards are contained in 57 canes?

*Ans.* 129.54 yards.

18. If 37 dollars equal 25 Chinese tales, what is the federal money value of 212.5 tales?

*Ans.*  $\$314.5$ .

19. How many shingles will it require to cover the roof of a house 40 feet in length, and of 18 feet rafters, allowing each shingle to cover 24 square inches?

*Ans.* 17280.

20. What number of Bricks will it require to build an house, 40 feet long and 30 feet wide, with a wall of 17 feet to the eaves, and 1 foot thick, allowing 27 inches to 1 cubic foot, and a deduction of 1 quarter for the space of doors and windows?

*Ans.* 26808 Bricks.

21. If  $67\frac{1}{2}$  acres be plowed by 6 men in 15 days; how many acres can 18 men plow in 60 days?

*Ans.* 8100 acres.

22. If 9 tailors can make 36 suits of clothes in 6 days; how many tailors, in 36 days, can clothe an army of 2520 men?

*Ans.* 17.5 tailors.

23. How many yards of shalloon, 5 quarters wide, will line 15 coats, each containing  $3\frac{1}{2}$  yards of cloth, of 3 quarters wide?

*Ans.* 31.5 yards.

24. A. put 257 dollars to interest for 8 months, and then received, for principal and interest, 267 dollars, 28 cents: I demand at what rate *per cent. per annum* he received interest?

*Ans.* 6 *per cent. per ann.*

25. At the rate of 6 *per cent. per ann.*, what principal will amount to 100 dollars in 12 months?

*Ans.*  $\$94.34$ , almost.

26. If a stick of timber 56 feet long, 9 inches broad, and 13 inches thick, cost £11., 18; what is the worth of 6 sticks, 37 feet long, 10 inches broad, and 7 inches thick?

*Ans.* £28.224.

27. If 40 men in 15 days can perform a certain piece of work, how many men will accomplish another 3 times as great, in a fifth part of the time?

*Ans.* 600 men.



28. How much Sugar at 9 pence *pr.*  $\frac{1}{2}$  lb. must be given in barter for 127 lb. of Tea at 3s 6 *pr.*  $\frac{1}{2}$  lb. ?

*Ans.* 27 lb. 3 oz.

29. A farmer sold wheat to his merchant, to the amount of 342 dollars, 75 //; at the rate of 75 cents *pr.* Bushel—what was the number of Bushels sold?

*Ans.* 457.

30. But the merchant failing before payment, was able to remit but 64 // upon the dollar—how much did the farmer lose ? and what were his avails ?

*Ans.* Avails  $\$$  219.36

Loss 122.39

31. The farmer, contriving how to regain his property in the usual method of speculation, vested the avails of his wheat in western wild lands, at the price of 62 // *pr.* acre, and afterwards sold the same for  $\$$  1.75 *pr.* acre—What gain *pr. cent.* did he make ? and what was his whole profit.

*Ans.*  $\$$  182.258 *pr. cent.*

399.80 whole profit.

32. The farmer now resolved to commence the more elegant life of a merchant—accordingly repairs to New-York, lays out the whole avails of his lands in goods, and takes up as much more on 6 months credit—he retails them chiefly upon trust, at the advance of 25 *per cent.* upon the first cost, in addition to the expence of transportation. At the end of 6 months, he found his business in the situation following, *viz.* His wife and daughters had taken up, in articles of dress, furniture, sugars, spices, &c. &c. to the amount of 500 dollars—his clerk embezzled 117 dollars, // 92—as much as 340 dollars worth of his goods were so illy chosen as to be perfectly unsaleable—all the rest of his goods were retailed, and the money received in, 144 dollars, // 79. Six of his customers who owed him in all 191 dollars, // 69, absconded—*Question.* How much *per. cent.* exclusive of all contingent expences, did the farmer-merchant lose ? what was the sum

total of his loss—and how much did he realize in the end?

*Answer.*

He lost  $\$74.41$  3 *pr. cent.*

1149.61 in the whole.

And realized but 398.29.

## L E S S O N XVII.

### EQUATION OF PAYMENTS.

**Q.** **W**HAT is the nature and use of this Rule?

*A.* It is to find an equitable mean time for the payment of a debt, or several debts, due at different times.

**Q.** What is the rule of operation?

*A.* Take the debt, or the sum total of the several debts, for a divisor; and the sum of the products, made by multiplying each payment with its respective time, for a dividend; and the quotient will be the equated time.

#### EXAMPLES.

1. S. owes T. £597.,15, of which £143 is to be paid in 5 months and 12 days; £287 in 8 months and 18 days, and £167.,15 in 14 months: but S. agreeing to discharge the whole debt in one payment, to how long a pay-day is he entitled?

$$143 \times 5.54 = 779.35$$

$$287 \times 8.72 = 2402.64$$

$$167.75 \times 14 = 2348.50$$

$$597.75 \quad ) 5530.49 ( 9.2522 = 9mo. 7 days.$$

**NOTE.** Find the decimal parts of time in the above example, by the Scale in page 214.

2. There is due to a merchant the sum of 1148 dollars, from one man, in three several notes of hand; one for 135 dollars, //15, becoming due in 3 months; another for 684 dollars, in 6 months and ten days, and the rest in a third note, in 12 months. The debtor takes up those notes, and gives one note for the whole debt: What time of payment must the note express?

*Ans.* 7 months and 20 days.

## LESSON XVIII.

## PARTNERSHIP.

Q. **W**HAT is Partnership?

A. It is where two or more merchants, or others, by voluntary agreement, form a company, and unite their property in a common stock, for their mutual advantage in business.

Q. *What is incidental to such a partnership?*

A. 1. Each partner must share in the eventual gain or loss of the company, in proportion to his individual share of stock in the common capital, unless otherwise stipulated in the agreement of the company.

2. The contracts of each partner are binding upon the whole company, and the reverse; and they are severally liable for each other's debts contracted during the time of their partnership.

Q. *How is a partnership dissolved?*

A. By the mutual agreement of its members, and a public notification given of the same, according to the custom of merchants, and the rules prescribed by law.

Q. *How is Partnership divided?*

A. 1. Into Simple Partnership, that is, when the stocks of each partner continue for an equal term of time. And,

2. Compound Partnership, that is, when the stocks continue an unequal length of time.

## S E C T. I.

## SIMPLE PARTNERSHIP.

Q. *To what other cases in practice does this rule apply, besides that of mercantile and other companies formed by voluntary association?*

A. It applies to the division of the estate of a bankrupt, or an insolvent intestate, among his individual creditors, according to the sum of their several claims—

Q



to the assessment of school, town, county or state taxes, where they are made up by a common ratio of pence upon the pound, or cents upon the dollar, &c. and indeed to all imaginable cases, where, by the operation of law, or the principles of equity and common justice, a common loss or gain, according to a certain proportion, is to be shared by a number of individuals.

*Q. What is the rule of operation?*

**RULE.** As the sum of the several stocks is to the total gain or loss; so is each man's share in stock, to his share of the gain or loss.

By this rule of stating, make as many several operations in Direct Proportion, as there are partners in company, or persons concerned in the gain or loss.

*Q. How is the truth of the operation proved?*

**A.** By adding all the shares together, and finding their sum equal to the whole loss or gain: Or,

By inverting the operation, making the total gain or loss, the first term; the sum of the several stocks, the second, and each man's share of the gain or loss, the third.

#### EXAMPLES.

1. A. and B. purchased goods in company. A. paid 12 dollars, and B. 27: their gain in the sale of the goods was 9 *doll. 75 cts.* What was each man's share?

A.	B.
$12 + 27 = 39 \quad \text{Z} \quad 9.75$ $12 \quad \text{Z} \quad Q. = \$3 \quad \text{Ans.}$	$39 \quad \text{Z} \quad 9.75$ $27 \quad \text{Z} \quad Q. = 6.75. \quad \text{Ans.}$

2. George Selby, merchant, broke for 25000 *doll.* The whole amount of his property was but 9875 *doll.* How much upon the dollar could he average to his creditors? and what was their respective losses, who severally claimed as follows, *viz.* J. S. 7239 *doll. 75 cts.* A. W. 3257 *doll. 75 cts.* R. N. 5486 *doll. 55 cts.* and G. L. 9016 *doll. 45 cts.*?

*Ans. .39 5 upon the doll.*

J. S. lost  $\$4380.10 \ 7$

R. N. lost 3319.36 3

A. W. 1970.63 6

G. L. 5454.98 4

3. A town-tax is to be made up, of 3 cents upon the dollar, assessed upon a number of men, according to the amount of their rateable property in their several lists, annexed to their names, as follow, viz. James Grimstead 2745doll. 25cts. Charles Tucker 1263doll. 34cts. Jonathan Hooke 857doll. 43cts. Eleazer Carey 420doll. 67cts. Isaiah Warner 89doll. 85cts. and Nicholas Heister 3568doll. 72cts. What was each man's tax?

*Answer.*

J. G.	82.35 3
C. T.	37.90
J. H.	25.72
E. C.	12.62
I. W.	2.69 6
N. H.	107.06 2

*NOTE.* In this last Example, and in all others of the same kind, you need only to multiply each man's stock or list, by the rate of the tax, or the number of cents expressed in decimals of a dollar, as .03, and the product will be the answer sought.

Take James Grimstead's list for an example, and it will sufficiently explain the rule to the learner.

$$\begin{array}{r} 2745.25 \\ \text{Multiplied by } .03 \\ \hline \end{array}$$

J. G.'s tax, 82.3575

## S E C T. 2.

### COMPOUND PARTNERSHIP.

*Q. What is Compound Partnership?*

*A.* It is where the stocks continue an unequal term of time, and each partner is to share in the whole gain or loss, in proportion to the *compound* ratio of his particular stock and time taken together: Wherefore it is called *Compound Partnership*.

*Q. What is the rule of stating?*

*RULE.* Multiply each man's stock into its time, and add the several products together, for a first term in

Direct Proportion. Take the whole gain or loss for the second term; and each particular product, or the square of each man's stock and time for the third term.

Q. How is this rule proved?

A. As in Simple Partnership.

#### EXAMPLES.

1. A. and B. were joint tenants of a mill, in the building of which A. laid out 150 dollars, and B. 270. At the end of 7 months, A. sold his share to B. and at the end of the first year B. sold the mill. They then made a settlement; and, the year's profit of the mill being ascertained at 350 dollars; what was each man's share?

$$150 \times 7 = 1050$$

$$270 \times 12 = 3240$$

A.	B.
4290 <b>Z</b> 260	4290 <b>Z</b> 260
1050 <b>Z</b> 0.	3240 <b>Z</b> 0.
Ans. A. \$63.63 6	B. 196.36 4

2. Three merchants traded together: A. put in 400 dollars, for 9 months; B. 333doll. 33cts. for 16 months, and C. 366doll. 67cts. for 14 months. They gained 350 dollars. What was coming to each?

Ans. To A. 89.57

B. 132.70

C. 127.73

3. Jacob M'Ewen, Giles Jackson, John Hastings, and Anthony Minot, were joint tenants of a certain toll bridge, which they held for the term of 14 years, by charter. Their whole expence in building the bridge was 25745doll. 50cts. of which M'Ewen paid 4896.67, Jackson 1675, Hastings 12392.37, and Minot 6780.96. At the end of  $2\frac{1}{2}$  years, M'Ewen sold out to Peter Thomson; at the end of 5 years, Jackson sold out to Jeremiah Apthorp; at the end of 10 years, Hastings sold his share to James Hawkins; at the ex-



piration of the fourteen years, the whole tollage amounted to £30000 : What was each man's share?

*Answers.*

M'Ewen,	£1018.90 3
Jackson,	697.07
Hastings,	10314.87 1
Minot,	7901.52 8
Thomson,	4686.95 3
Apthorp,	1254.72 7
Hawkins,	4125.94 8

## L E S S O N XIX.

### SIMPLE INTEREST.

**Q.** **W**HAT is Simple Interest?

*A.* It is the profit arising from a sum of money lent, or for the forbearance of any debt due. Upon the same principle, and by the same rule of operation, it also extends to the premiums given for *factorage, brokerage, storage, insurance, buying and selling of stocks, &c. &c.*

**Q.** *What are the technical parts of this Rule?*

*A.* 1. The **PRINCIPAL**, or the sum lent, or due.

2. The **RATIO**, or Rate *per cent.* which is a certain sum, payable for every 100 pounds or dollars principal; and in the same proportion for any sum greater or smaller.

3. The **TIME**, or length of forbearance for which interest is to be computed.

4. The **INTEREST**, or premium due for forbearance, according to the given Ratio and Time.

5. The **AMOUNT**, or principal and interest added together.

**Q. 2**

## L E S S O N XX.

How to reckon Interest upon any Sum, at any Rate *pr. cent.* for 1 Year; the same Rule equally applying to *Factorage, Brokerage, Storage, Impost, Insurance, buying and selling of Stocks, &c.*

Q. **W**HAT is the Rule in this Case?

A. 1. Express the principal decimally, if there be parts of a pound, or of a dollar, in the given sum.

2. Multiply the principal by the Ratio, decimally expressed; and the product is the interest sought, in pounds and decimals, or in dollars and cents.

## S E C T. I.

The PRINCIPAL, in Pounds, Shillings, &c.

## EXAMPLES.

1. What is the interest of £35,,10,,6, for 1 year, at 6 *pr. cent*?

$$\begin{array}{r} \text{Princ.} \quad 35.525 \\ \text{Ratio,} \quad \times .06 \\ \hline \end{array}$$

$$\text{Interest, } 2.13150 = £2,,2,,7\frac{1}{2}.$$

NOTE. If the Ratio be 5 *per cent.* you have only to read the pounds and decimals, principal, as shillings and decimals, interest.

2. What is the interest of £175,,3,,6, at 5 *pr. cent*?

$$\text{Ans. } f. 175.175 = £8,,15,,2.$$

3. What is the interest of £987,,17,,9 at  $\frac{1}{2}$  *pr. cent.*

$$\text{Ans. } £4,,18,,9\frac{1}{2}$$

Answers.

4. Of £325,,17,,11, at 1 *pr. cent.*\*? £3,,5,,2

5. Of 231,,5,,9, at 2 *pr. cent.*? 4,,12,,6

\* In this ratio you have only to remove the decimal point two figures towards the left hand.

$\pounds$ .	Answers.
6. 263, 7, 4 $\frac{1}{2}$ , at 3 pr. cent. ?	$\pounds$ 7, 10
7. 823, 5, 5, at 4 pr. cent. ?	32, 18, 7 $\frac{1}{2}$
8. 5721, 15, 8, at 5 pr. cent. ?	286, 1, 9
9. 89, 12, 6, at 6 pr. cent. ?	5, 7, 6 $\frac{1}{2}$
10. 6520, 4, 5, at 7 pr. cent. ?	456, 8, 3 $\frac{3}{4}$
11. 375, 13, 4, at 8 pr. cent. ?	30, 1
12. 257, 16, at 9 pr. cent. ?	23, 4
13. 345, 6, 8, at 10* pr. cent. ?	34, 10, 8
14. 192, 1, 1, at 11 pr. cent. ?	21, 2, 6
15. 3752, 17, 1, at 12 pr. cent. ?	450, 6, 7 $\frac{3}{4}$

## S E C T. 2.

## FEDERAL MONEY.

1. What is the interest of  $\pounds$  118.40, for 1 year, at 6 pr. cent. pr. ann. ?

$$\pounds 118.40.$$

$$\times .06$$

$$\pounds 7.1040 \quad \text{Ans.}$$

2. What is the interest of  $\pounds$  583.92, at 5 pr. cent. for 1 year ?

NOTE. At 5 pr. cent. interest on Federal money, nothing more is necessary, but to remove the point one figure towards the left hand and then halve the sum as follows :

$$2) 58.392$$

$$\pounds 29.186$$

Ans.

Again, remove the decimal point in the principal as before : and, if the ratio be 9 pr. cent. subtract the principal from itself ; but, if 11 pr. cent. add it ; observing, in either case, to set the first left hand figure of the lowermost number, under the second in the upper number. See the next examples.

3. What is the interest of  $\pounds$  385 29, for 1 year, at 9 pr. cent. ?

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\* At 10 per cent ratio, only remove the decimal point in the principal one figure towards the left hand, and the interest is found.



$$\begin{array}{r} 38.529. \\ -3.8529 \\ \hline \end{array}$$

Ans.  $\pounds 34.6761$

4. What is the interest of  $\pounds 67.45$ , at 11 *pr.* cent. for one year ?

$$\begin{array}{r} 6.745 \\ \times .6745 \\ \hline \end{array}$$

Ans.  $\pounds 7.4195$

5. What is the interest of  $\pounds 3292.80$ , at  $\frac{1}{2}$  *per* cent. ?

Ans.  $\pounds 16.464$   
Answers.

6. $\pounds 1086$ , at 1 <i>per</i> cent. ?	$\pounds 10.86$
7. 769, at 2 <i>per</i> cent. ?	15.38 9
8. 887.89, at 3 <i>per</i> cent. ?	26.33 7
9. 2744.23, at 4 <i>per</i> cent. ?	10.77
10. 19072.62, at 5 <i>per</i> cent. ?	953.63
11. 278.75, at 6 <i>per</i> cent. ?	16.72 5
12. 853.34, at 7 <i>per</i> cent. ?	59.73
13. 252.20, at 8 <i>per</i> cent. ?	20.20
14. 119.50, at 9 <i>per</i> cent. ?	10.755
15. 1151.12, at 10 <i>per</i> cent. ?	115.112
16. 640.35, at 11 <i>per</i> cent. ?	70.43 8
17. 622.77, at 12 <i>per</i> cent. ?	75.73

## LESSON XXI.

How to compute interest at 6 *per* cent. *per ann.* for any length of time.

Q. **W**HAT concise Rule have you of casting interest at 6 *per* cent. for any length of time ?

A. RULE. Multiply the principal by one half the given time, reckoning in months and decimals, and point off for decimals in the product, two figures more than the number of decimal figures in both the factors.

## EXAMPLES.

1. What is the interest of £38,,10 for 8 months and a half at 6 per cent, per ann. ?

$$\begin{array}{r} 38.5 \\ \times 4.25 \\ \hline \end{array}$$

$$1.63625 = \text{£}1,,12,,8\frac{1}{4} \text{ Ans.}$$

Principal.	Ratio.	Time. yr. mo. d.	Interest.
2. £127,,15,,6	6 per cent.	13,, 7	£8,,13,,4 $\frac{1}{2}$
3. 87,, 9,,2	do.	11,, 8	5,, 0,,9
4. 1000	do.	1	3,,5
5. 1,, 1,,1	do.	7,, 5,,24	9,,5 $\frac{3}{4}$
6. 63,,17,,4	do.	8,,19	2,,15,,2 $\frac{3}{4}$
7. 529,,19,,9	do.	5,, 7,, 6	178,, 1,,6
8. 137,,13,,9	do.	16,, 8	137,,13,,9

## S E C T. 2.

### FEDERAL MONEY.

1. What is the interest of \$128.34, for 8 $\frac{1}{2}$  months?

$$\times 4.25$$

Principal.	Ratio.	Time. yr. mo. d.	Interest.
			Ans. 5.454'450
2. \$425.91	6 per cent.	1,, 1,, 7	\$28.74 8
3. 291.53	do.	11,, 8	16.76
4. 212.89	do.	8,,19	9.16
5. 1766.63	do.	5,,7,, 6	595.54

## L E S S O N XXII.

Where the Principal is in the Currency of N. England, or N. York, &c. to find its Interest or Amount in Federal Money.

1. Interest for 1 Year, at 6 per cent.

**R**ULE. Multiply the principal, if N. E. money,

by .2; if N. Y. &c. currency, by .15, and if at 7 per cent. by .175

## EXAMPLES.

1. Interest required in federal money, on £127, 3, N. E.

$$\begin{array}{r} 127.15 \\ \times .2 \\ \hline \end{array}$$

£25.530 *Anf.*

2. Interest required, at 6 and at 7 per cent. on £235, 8, N. Y.

$$\begin{array}{r} 235.4 \\ \times .15 \\ \hline \end{array}$$

$$\begin{array}{r} 235.4 \\ \times .175 \\ \hline \end{array}$$

£35.310 *Anf.* at 6 per cent. 41.1950 *Anf.* at 7 per cent.

2. The Amount, from 1 to 7 per cent. and from 1 to 12 years, by the following Tables.

RULE. Multiply by that tabular number standing where the given time and ratio meet.

## I. NEW-ENGLAND Money.

yr	rat. 1	2	3	4	5	6	7
1	3.367	3.4	3.734	3.47	3.5	3.534	3.567
2	3.4	3.467	3.534	3.6	3.334	3.734	4.8
3	3.434	3.534	3.667	4.734	3.834	3.934	4.334
4	3.467	4.6	3.734	3.867	4.	4.134	4.267
5	3.5	3.667	3.834	4.	4.167	4.334	4.5
6	3.534	3.634	3.934	4.134	4.34	4.534	4.734
7	3.567	3.8	4.034	4.267	4.5	4.734	4.967
8	3.6	3.867	4.134	4.4	4.667	4.934	5.2
9	3.634	3.934	4.234	4.534	4.834	5.134	5.434
10	3.667	4.	4.334	4.667	5.	5.334	5.667
11	3.7	4.667	4.333	4.8	5.167	5.534	5.9
12	3.734	4.134	4.534	4.934	5.34	5.734	6.134



## 2. NEW-YORK, &amp;c. Currency.

yr.	rat. 1	2	3	4	5	6	7
1	2.525	2.55	2.575	2.6	2.625	2.65	2.67
2	2.55	2.6	2.65	2.7	2.75	2.8	2.85
3	2.575	2.65	2.725	2.8	2.875	2.95	3.025
4	2.6	2.7	2.8	2.9	3.	3.1	3.2
5	2.625	2.625	2.875	3.	3.125	3.25	3.375
6	2.65	2.8	2.95	3.1	3.25	3.4	3.55
7	2.675	2.85	3.025	3.2	3.375	3.55	3.725
8	2.7	2.9	3.1	3.3	3.5	3.7	3.9
9	2.725	2.95	3.175	3.4	3.625	3.85	4.075
10	2.75	3.	3.25	3.5	3.75	4.	4.25
11	2.775	3.05	3.325	3.6	3.825	4.15	4.275
12	2.8	3.1	3.4	3.7	4.	4.3	4.6

## EXAMPLES.

1. Required the amount in federal money, of £287, N. E. on interest 7 years, at 5 per cent.

287

Tabular number, 4.5

£1291.5 *Ans.*

2. The amount of £37.9, N. Y. in 4 years, at 7 per cent. Tab. number, 3.2

£121.28 *Ans.*

## LESSON XXIII.

How to compute Interest for any Principal, Ratio, or Time.

**R**ULE. Find the decimal parts of a year, if any, by the Scale, page 214, and multiply the principal by the product of the ratio and time.

## EXAMPLES.

1. Required the interest of £113, 4, 9, for 2 months and 23 days, at 2 per cent. per annum.

$$2\text{mo. } 2\text{d.} = .17 \times .02 = .0034 \quad 113.2375 \\ \times .0034$$

$$38500750 = 7/8 \frac{1}{2} \text{ Ans.}$$

2. Interest on  $\pounds 187.62$ , at 3 per cent. for 1 year, 9 months and 3 days.

$$187.62 \\ 1\text{yr. } 9\text{mo. } 3\text{d.} = 1.76 \times .03 = .0528$$

$$9.806336 = \pounds 9.80 \text{ 6 } A.$$

	Principal.	Ratio.	Time.	Interest.
3	$\pounds 85.7.7$	4 per cent.	mo. 4.2	$\pounds 1.3.7 \frac{3}{4}$
4	$\pounds 331.58$	5	yr. 1.6.6	$\pounds 8.62 \text{ 1}$
5	$\pounds 27.10.5$	6	mo. 6.19	$\pounds 0.18.2$
6	$\pounds 1728.72$	7	mo. 7.18	$\pounds 76.23 \text{ 6}$
7	$\pounds 77.15.3$	8	yr. 1.3.9	$\pounds 7.10.7 \frac{1}{2}$
8	$\pounds 222.70$	9	mo. 9.16	$\pounds 15.93 \text{ 4}$
9	$\pounds 0.18.1$	10	mo. 10.15	$\pounds 0.1.7$

## L E S S O N XXIV.

How to reckon Interest, by Days, on any Principal, and on several Principals, for different Times—Accounts-current, Instalments, &c.

**R**ULE. Multiply each principal by its respective number of days, and divide the product, or the sum of the products (when more than one) after removing the decimal point two figures towards the left, if

At 5 per cent. by 73.

At 6 do. by 56.

At 7 do. by 51. And the quotient will be the answer.

### EXAMPLES.

1. What is the interest of 36doll. for 125 days, at 5 pr. cent. pr. ann.?

$$36 \times 125 \div 7300 = 0.61 \text{ 6 } \text{Ans.}$$

2. What is the interest of 360 dollars, for 87 days, 118 for 125 days, and 400 for 158 days, at 6 *per cent. per annum*?

<i>Principal.</i>		<i>Time.</i>
360	×	87 = 31720
118	×	125 = 20750
400	×	158 = 63200

56) 1156.70 ( \$ 20.66, *nearly.*

3. The purchaser of my estate is to pay me 1700 dollars in 4 yearly instalments of 425 dollars each, with interest on each, from the time of contracting, at 7 *per cent. per annum.* What is the whole interest arising upon the several instalments?

*Ans.* \$ 297.40

## L E S S O N XXV.

Interest on Bonds and Obligations, having partial Payments endorsed.

**R**ULE 1. Compute the interest upon the whole principal, for the whole time; then separately upon each indorsement for its respective time, and subtract the whole amount of the one from that of the other.

RULE 2. (*Established by the Superior Court of the State of Connecticut, A. D. 1784.*) “ Compute the interest to the time of the first payment; if that be one\* year or more from the time the interest commenced; add it to the principal, and deduct the payment from the sum total. If there be after payments made, compute the interest on the balance due to the next payment, and then deduct the payment as above; and in like manner from one pay-

\* By comparing this with the Introduction, the second paragraph of page 38, the reader will observe a small mistake of the author, in the construction of this rule.



“ ment to another, till all the payments are absorbed ;  
 “ provided the time between one payment and ano-  
 “ ther be one year, or more. But if any payment be  
 “ made before one year's interest hath accrued, then  
 “ compute the interest on the principal sum due on  
 “ the obligation for 1 year, add it the principal, and  
 “ compute the interest on the sum paid, from the time  
 “ it was paid, up to the end of the year ; add it to  
 “ the sum paid, and deduct that sum from the princi-  
 “ pal and interest, added as above.

“ If any payments be made of a less sum than the  
 “ interest arisen at the time of such payment, no in-  
 “ terest is to be computed, but only on the principal  
 “ sum, for any period.”

Take the following note of hand, by both rules,  
 for an

## EXAMPLE.

Value received, I promise to pay to George Apple-  
 ton, the sum of one hundred and twenty dollars, with  
 lawful interest. [6 per cent. per annum.] Witness my  
 hand.

PETER FRISBIE.

January 1, 1795.

*Endorsed thus :*

June 1, 1795. Rec'd on the within note 50dollar.  
 Oct. 1, 1795. Rec'd - - - 40dollar.

The last payment was made January 1, 1796.

*By Rule 1.*

120dollar. Principal, or sum of the note.

7.20 Interest for the whole time.

---

127.20 Amount,

---

50 First payment.

1.75 Interest.

---

51.75 Amount.

---

40 Second payment.  
 .60 Interest.

---

40.60 Amount.

---

51.75 } Several amounts of payments.  
 40.60 }

---

92.35 Total amount—subtract it from amt. of debt.

---

§ 34.85 Remains due on the note.

*By Rule 2.*

120doll. Note.

7.20 Interest for one year.

---

127.20 Amount.

51.75 First payment, deducted.

---

75.45 Due June 1, 1795.

4.52 Interest for 1 year.

---

79.97 Amount.

41.60 Second payment, deducted.

---

38.37 Due October 1, 1795.

.57 Interest to January 1, 1796.

---

§ 38.94 Amount, or sum due, by Rule 2.

34.85 Ditto, by Rule 1.

---

4.09 Difference.

*Contraction of Rule 1.*

RULE. Point off the right hand figure of each principal for a decimal; multiply each by its particular time, and add the products. If the principal were pounds, &c. the sum total will be shillings and decimals; but if federal money, halve it for dimes, in-

terest, which, added to the last principal, gives the sum due.

*Resume the former Example.*

*Time.*

1st Principal,  $\$12.0 \times 5 \text{ mo.} = 60$

2d do. - - -  $7.0 \times 4 = 28$

3d do. - - -  $3.0 \times 3 = 9$

97

4.85 Interest.

30 Last principal.

\$34.85 Amount due.

NOTE. To find either the Principal, Time, or Ratio, when the other terms are expressed in the question, apply the Rule of Three, according to the specimens in the 7th, 15th, 24th and 25th Examples, in Lesson XVI.

## LESSON XXVI.

### COMPOUND INTEREST.

Q. **W**HAT is Compound Interest?

A. It is Interest upon Interest, or taking the amount of principal and interest for the first year, as a new principal for the second year, and the amount of the second, for that of the third, and so on.

- Q. Is there not a shorter process of reckoning Compound Interest?

A. Yes. Take a different time, which bears the same proportion to the given time, as Compound does to Simple Interest; then reckon Simple Interest on the given principal for that assumed time, which will be its Compound Interest for the given time: and if there be any fractional part of a year, make a second operation at Simple Interest for that.



# COMPOUND INTEREST. 245

By the following Table, containing the given time in the left hand column, and the assumed time written against it at the right hand, from 4 to 10 per cent. Compound interest may be reckoned upon any principal, for any number of complete years, from 2 to 20, by operation of the Rule in Lesson XXIII.

*NOTE. The table is not calculated to give the Compound Interest with perfect exactness; yet the variation is so very small, that it will conveniently answer every practical purpose.*

Given  
Time.

Years.	4 <sup>th</sup> ct.	5 <sup>th</sup> ct.	6 <sup>th</sup> ct.	7 <sup>th</sup> ct.	8 <sup>th</sup> ct.	9 <sup>th</sup> ct.	10 <sup>th</sup> ct.
2	2.04	2.05	2.06	2.07	2.08	2.09	2.1
3	3.12	3.15	3.18	3.21	3.24	3.28	3.31
4	4.25	4.3	4.37	4.43	4.05	4.57	4.64
5	5.42	5.52	5.63	5.74	5.86	5.98	6.1
6	6.64	6.8	6.97	7.14	7.33	7.52	7.71
7	7.93	8.14	8.39	8.64	8.92	9.2	9.48
8	9.24	9.55	9.89	10.24	10.63	11.03	11.43
9	10.61	11.	11.48	11.96	12.48	13.12	13.57
10	12.04	12.57	13.17	13.8	14.	15.29	15.83
11	13.54	14.2	14.96	15.86	16.15	17.66	18.42
12	15.09	15.93	16.86	18.07	18.49	20.24	21.27
13	16.69	17.72	18.87	20.43	21.02	23.05	24.41
14	18.33	19.6	21.	22.96	23.75	26.11	27.86
15	20.09	21.58	23.26	25.67	26.69	29.45	31.66
16	21.9	23.65	25.8	28.57	29.88	33.09	35.84
17	23.5	25.83	28.49	31.67	33.32	37.06	40.43
18	25.44	28.02	31.34	35.09	37.04	41.39	45.48
19	27.58	30.32	34.36	38.64	41.05	46.11	51.04
20	29.84	32.74	37.56	42.44	45.38	51.25	57.16

**RULE.** Multiply the principal by the product of the assumed time and given ratio, and that product will be the Compound Interest for the given time.

## DISCOUNT.

## EXAMPLES.

What is the compound interest of  $\$235.75$ , for 7 years, at 4 per cent. per annum?

Assumed time is 7.93

$235.75$

Ratio,

$\times .04$

$.3172$

$.3172$

$\$74.779900$  Ans.

	Principal.	Time.	Ratio.	Comp. Interest.
2.	$\$623.16$	8 years.	5 per cent.?	$\$297.56$
3.	75.50	9 do.	6 do.	52.
4.	326.61	3 do.	7 do.	73.39
5.	350.	7 do.	8 do.	249.76
6.	115.55	6 do.	9 do.	78.20 5
7.	327.45	5 do.	10 do.	199.74 4
8.	121.21	$6\frac{1}{2}$ do.	5 do.	45.27 2
9.	144.	18 do.	6 do.	270.77 7

## LESSON XXVII.

## DISCOUNT.

Q. **W**HAT is Discount?

A. It is the reverse of Interest, being a sum allowed to the debtor for the payment of a debt before it becomes payable; or, it is the payment of so much present money, as, being put out to interest, would amount to the given sum, due in future payment.

Q. How is the discount, and present worth of any sum of money, found?

A. By the Rule of Proportion, in Lesson XVI, and stated as follows, viz.

RULE 1. To find the *Discount*, take the amount of 100 dollars, or pounds, for the given time and ratio, for the first term; the given ratio, for the second, and the principal for the third.

RULE 2. To find the *present worth*, take 100 for the second term, and the given principal for the third.

**RULE 3.** Subtract either the discount, or present worth when found, from the principal, and the remainder will be the other sum.

## EXAMPLES.

1. What is the discount of 100 dollars, for 1 year, at 6 per cent.?

$$\begin{array}{r} 106 \\ 100 \end{array} Z 6 Q. = \$5.66 \text{ Ans.}$$

2. What is the present worth of 100 dollars, payable in 1 year, discounting at 6 per cent. per annum?

$$\begin{array}{r} 106 \\ 100 \end{array} Z 100 Q. = \$94.34 \text{ Ans.}$$

*Note. These examples mutually prove each other, as either answer, being subtracted from 100 dollars, leaves the other.*

3. What is the discount of \$175.55, for 2.5 years, at 5 per cent. per annum? *Ans. \$19.50 4*

4. What is the present worth of 350 dollars, payable in 4 years, at 7 per cent. per ann. discount?

$$\text{Ans. } \$273.4375$$

## S E C T. 2.

*Discount, at Compound Interest.*

**RULE.** Take the assumed time for the given time, by the Table, and calculate the discount at Simple Interest upon that.

1. What is the present worth of 350 dollars, payable in 4 years, at 7 per cent. per annum, compound interest discount?

$$\text{Assumed time } 4.3 \times \text{ratio } 7 = 131.01 \begin{array}{r} 100 \\ 350 \end{array} Z Q. = \$267.15 5$$

2. What is the compound interest discount on 500 dollars, for 8 years, at 6 per cent. per annum?

$$\text{Ans. } \$186.20 6$$

3. What is the present worth of 1000 dollars, payable in 12 years, discounting in compound interest, at 10 per cent. per annum?

$$\text{Ans. } \$319.72 5$$



A COMPENDIOUS TREATISE ON  
BOOK-KEEPING;

OR,

ACCOMPTANTSHIP REDUCED TO PRACTICE.

THE importance of Accomptantship is so generally known, and its utility so universally acknowledged, that any commendation will be unnecessary, further than to observe, that a thorough knowledge of the art is essential to the character of a Man of Business. The *Italian* method of Book-Keeping is so perfect a system of its kind, that the mercantile world have generally adopted it in the management of accompts. Its principles are founded in reason, since it is evident, that no transaction can be made, that is not accountable to another. It is my object, therefore, to give a concise specimen of Book-Keeping, in the method of double-entry.

*Of Books of Accompt.*

Three books are indispensably necessary for every man in mercantile business, viz. the WASTE-BOOK, JOURNAL, and LEDGER; besides a number of subsidiary books, according to the variety and extent of his business.

1. *The WASTE-BOOK.*

The *Waste-Book* contains the subject matter from which the two other books are formed. It opens with an Inventory of the several articles composing a merchant's stock, together with the debts incumbering it; after which follow the daily occurrences of trade, such as buying, selling, &c. In this book, every transaction relating to a merchant's business, ought to be explicitly entered, without paying that particular attention to method and style which ought to be observed in the Journal, where the several Debits and Credits are clearly ascertained.

2. *The JOURNAL.*

The *Journal* is a book preparatory to the Ledger, into which every entry from the Waste-Book, ought to be fairly transcribed in a legible hand, and in that kind of laconic style peculiar to merchants. This book is considered by men of mercantile business as essentially necessary, and indeed its utility is obvious—the hurry in which entries are frequently made in the Waste-Book—the inaccuracy and negligence of young clerks who are allowed to write in that book—the difficulty of posting from it into the Ledger, together with the mistakes that would probably arise from that practice, are good and substantial reasons with merchants for using this intermediate book, *The Journal*.

The principle upon which this method of Book-Keeping is founded, precludes the necessity of writing the word *Credit*, at all in the Journal; for, as before observed, no transaction can be made that is not accountable to another; that is, no charge can in reason be made, that does not answer to some corresponding credit. Hence arises the necessity of raising fictitious accounts, as *Profit and Loss*, &c.—The Journal should be written in a fair hand, with great attention to neatness and accuracy.

3. *The LEDGER.*

The *Ledger* is the grand book of account, made up from the Journal, wherein the several articles composing the different accounts, are so arranged under their proper heads, as to exhibit at one view, a true statement of a merchant's affairs, which is the sole end and design of Accountantship.

Every account in the Ledger ought to be opened in a fair text hand; and great care should be taken that no blots or erasements happen in this book.

*Of SUBSIDIARY BOOKS,*

I have not room to say much. The Invoice and Letter Books are used by most men in business. The others, such as Bill-Book, Book of Commissions, Book

of Accompts current, &c. are of such a nature, that they must be left to the ingenuity and discretion of merchants, to use, as the variety and extent of their business may require.

GENERAL RULES for *Journalizing*, and for *posting* into the *Ledger*.

In *Journalizing*, or transcribing from the Waste-Book into the Journal, it is necessary to keep, in idea, this fundamental principle, that, when any accmpt, whether real, personal, or fictitious, is charged, some other accmpt must be discharged to the same amount. Hence the necessity of clearly expressing the corresponding Credit, to every Debit in the Journal. The term, *Profit and Loss*, was invented to supply the defect of a debtor or creditor, when no other accmpt could in reason be debited or credited, for any things received in, or paid out. So likewise the term, *Stock*, has been substituted for the Merchant's own name.

In posting from the Journal into the Ledger, the date of the transactions must be inserted in a column allotted for that purpose ; after which, the accmpt, Debited, or Credited, must be expressed, noting, in the column immediately preceding the money-columns, its reference to the folio in the Ledger, where its corresponding accmpt is opened : and if any error be discovered in either the Debit or Credit side of the Ledger, make no erasement or interlineation to rectify it, but balance the error by a corresponding entry on the opposite page of the folio.

To the Ledger, an *Index* is necessary, wherein the names, and titles of every accmpt, are arranged in alphabetical order, quoting the folio where such accmpt stands.

Of BALANCING.

Merchants are induced, once in every year, or oftener, to balance their books ; as well to shew the true state of their affairs, as to determine whether their ac-



compts have been kept with accuracy. To accomplish this, pursue the following

#### DIRECTION.

Begin with the first accompt in your Ledger, omitting, however, the accompts of Stock, and of Profit and Loss; personal accompts unclosed, must be evened by balance—the balance being in your favor, carry it to the debit side of Balance-accompt; if against you, carry it to the credit side. In accompt of goods, if any remain unfold, (which will appear by adding up each side of the inner columns, ruled for that purpose) carry the difference of quantity, at the original cost, to the debit side of Balance-accompt—then balance the money column, by Profit and Loss: If gained by this article, Profit and Loss must be credited; if lost, that accompt must be debited for the difference. In this way, proceed thro' the Ledger; after which, balance Profit and Loss accompt, and carry the difference to Stock-accompt. *Lastly*, balance Stock-accompt; and if the difference between the debit and credit side of this accompt, will even Balance-accompt, your books are, most assuredly, kept accurately; if not, there is, as certainly, some error—for the discovery of which, your books must be pricked over, and the whole foregoing process gone thro' a second time.

#### GENERAL OBSERVATIONS.

After all, it will be extremely difficult for a *retailer* strictly to adhere to the formality of this method of Book-Keeping. The great variety of articles in which he deals, the small quantities in which they are dealt out, together with the hurry and confusion in which business is frequently transacted in a retail-shop, render it almost impracticable to keep an accurate Sales-accompt of the quantity of commodities sold. To obviate this difficulty, men acquainted with business in the retail line, have adopted the practice of opening

a general accompt, termed *Merchandize General*, to which all purchases and sales of merchandize have reference. The foregoing rules for balancing are equally applicable to this method, only it will be necessary in this case, at the time of balancing, to take an Inventory of all goods remaining on hand, which come under the common denomination of *Merchandize general*.

In a book of this kind, it is impossible to comment with minuteness upon each particular branch of so extensive a system, as the Italian method of Book-keeping: The general rules and fundamental principles, only, can be comprised in this imperfect compendium. It is hoped, however, that the foregoing rules and observations, exemplified and illustrated by the following practical Specimen, will convey a general knowledge of the art to the student, and thus answer the important purpose for which they are introduced.

I NO 61

Lanfingburgh, September 1<sup>st</sup>, 1796.Inventory of the money, effects  
and debts, belonging to, and ow-  
ing by me,

PETER LOVETRADE.

I have in Cash	£ 1500	
5 Puncheons Rum, 600		
gall. which I value at	750	
1.25 $\text{p}$ gall.		
00 Rolls Plug Tobacco		
1400wt. .14	196	
200 Sides Sole Leather,		
3225wt. at .18	580.50	
1500 Bush. Salt, at .75	1125	
4 qr. Casks Sherry Wine,		
130gall. at 1.12 $\text{p}$ gall.	145.60	
4 Hhd. Molasses, 440gall.		
at .60 per gall.	264.	
John Hamilton owes me,		
per note, on demand,	231.19	
William Jones, pr. acct.	97.71	
Benjamin Conner, pr. do.	110.	
		5000

I owe as follows :

To Henry Bell, per acct.	£ 250.	
To John Farrow, per do.	75.	
To Joseph Redfield, per		
note, 15 days to run	375.	
		700

6th.

Sold for Cash 47 sides Sole		
Leather, 630wt. at .21 pr. lb.	132	30
10th.		
Rec. of J. Hamilton in full of his note	231	19

S



(2)

## WASTE-BOOK.

September 15th.

Paid my note to Joseph Redfield, in full	375	
20th.		
Sold Abram Cunningham 1 Punch. Rum, 123 gall. 1.50 per gall. 184.50		
350 Bush. Salt, at 1.10 per bush. 385.		
1 Hhd. Molasses, 108 gall. at .75 81.		
To pay at 30 days.	650	50
24th.		
Paid Henry Bell in full	10	
26th.		
Paid District Collector, for licence to retail Spiritous Liquors & Wines	10	
27th.		
Bought for Cash 376 $\frac{2}{3}$ bush. Wheat, at 1.50 per Bushel	564	50
30th.		
Paid Charges this Month	34	15
October 3d.		
Sold James Carey 37 Sides Sole Leather, 592 lb. at .22 per lb. and rec'd in money 76.24		
His note at 30 days for } 54.		
3 remainder	130	24
5th.		
Paid John Farrow, in full,	75	
8th.		
Rec'd of William Jones, in full,	97	71
10th.		
Bought for Cash 432 $\frac{4}{6}$ bush. Wheat, at 1.50 per Bushel	657	64
12th.		
Rec'd of Benjamin Conner, in full,	110	

# BOOK-KEEPING.

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## WASTE-BOOK.

(3)

October 14th.			
Ship'd for New-York, on board the sloop Tryall, Capt. Hickok, 815 bush. Wheat, at measure, consign'd to him for sales and return; and paid charges of boating, &c. till on board	24	45	815
17th.			
Sold for Cash one Puncheon Rum, containing 120 gall. at 1.45	174		
20th.			
Sold Peter Olds 600 bush. Salt, at 1.10, to pay at 20 days	660		
22d.			
Sold Joshua Johnson 2 Casks Sherry Wine, 67 gall. at 1.50, for which rec'd his note, at 30 days, for	100	50	
25th.			
Rec'd of Abram Cunningham 347 bush. Wheat, on acct. at 1.55			537.85
10 Casks Flaxseed, cont'g 70 bush at 1.60, and casks at \$1 each	659	85	122.
Paid Abram Cunningham the balance due him on acct. of his Wheat and Flaxseed	9	35	
27th.			
Bought of Nicholas Grocer, New-York, 4 Chests Bohea Tea, weighing, nett, 1388 lb. at .35 per lb.			485.80
100 lb. Lump Sugar, at .26			156.
For which gave my note at 60 days.	641	80	
29th.			
Capt. Hickok has returned from N. York, and I have settled with him on the sales of my Wheat: it weighed out 806 $\frac{4}{8}$ bush. Sold at 1.84 pr. bush.			1484.26 $\frac{1}{2}$
Deduct for Freight, &c.			34.26 $\frac{1}{2}$
Nett Proceeds rec'd in full.			1450

(4)

## WASTE-BOOK.

<u>October 31st.</u>		<del>51</del>	<del>23</del>
Paid Charges this Month		51	23
<u>November 1st.</u>			
Barter'd 250 bush. Salt, at 1.12, for 20 Casks Flaxseed, cont'g 140 bush. at 2.		280	
Paid Cash for the Casks, at 1. each		20	
<u>3d.</u>			
Rec'd of James Carey 20 bush. Wheat, at 1.52		30.40	
Cash in full of his note		23.60	
			54
<u>5th.</u>			
Paid Freight and Charges on my Tea and Sugar, this day rec'd from N. York		5	
<u>5th.</u>			
Bought 639 $\frac{4}{6}$ bush. Wheat of Joseph Farmer, at 1.76 per Bushel; for which paid as follows:			
Salt 250 bush. at 1.12		280.	
Bohea Tea, 1 Chest, nett 349 lb. } at .42 per lb.		146.58	
50 Sides Sole Leather, 750 lb. at .21		175.50	
200 lb. Lump Sugar, at .29		58.	
1 Puncheon Rum, 120 gall. at 1.48		189.44	
1 qr. Cask Sherry Wine, 33 gall. at 1.50		49.50	
Cash in full		244.94	
			1125 96
<u>10th.</u>			
Bought for Cash 450 bush. Wheat, at 1.76 per Bushel		792	
<u>12th.</u>			
Sold for Cash 2 hhd. Molasses, 218 gall. at .72 per Gallon		156	96
<u>Rec'd of Peter Olds, in full</u>		660	



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## WASTE-BOOK.

(5)

<u>November 16th.</u>		¥	
Sold Abram Perkins 1 Puncheon Rum, 120 gall. on account of which I have received 56 bush. Wheat, at 1.75 per Bushel	98.		
And his draught on Wm. Johnstone, for remainder	82.		
	—	180	
<u>19th.</u>			
Lent Peter Punctual, to be paid on demand,		100	
<u>23d.</u>			
Ship'd for New-York, on board sloop Hare, Capt. Johnson, 1473 bush. Wheat, at measure, with orders to sell for Cash, and purchase for me 4 Puncheons Rum; paid charges till on board		47	10
<u>28th.</u>			
Rec'd of Joshua Johnson, in full of his note		100	50
<u>30th.</u>			
Paid Charges this Month		39	25
<u>December 1st.</u>			
Ship'd my 30 Casks of Flaxseed on board the Ranger, Capt. Green, consigned to Henry Stewart, New-York, to sell for my account: Paid Charges till on board		4	50
<u>7th.</u>			
Settled with Capt. Johnion on the sale of my Wheat: weigh'd in New-York 1455½ bush. at 2.25 per Bushel, and receiv'd as follows, in full:			
4 hhd. Rum, 488 gall. at 1.25	610.		
Charges on do.	5.		
Do. on Wheat	59 28		
Cash in full	2600.59		
		3274	87

(6)

## WASTE-BOOK.

<u>December 12th.</u>		£	
Sold Jonathan Brewster, at 60 days,			
1 Puncheon Rum, 117 gall. at 1,50	175.50		
1 Chest Tea, 347 lb. at .40	138.20		
100 lb. Lump Sugar, .30	30.		
		343	70
<u>15th.</u>			
Rec'd advice from Henry Stewart, that			
my 30 Casks of Flaxseed had arrived			
safe. Amount, with Charges,		455	10
<u>17th.</u>			
Paid Capt. Green the Freight and Char-			
ges on my Flaxseed		28	60
<u>20th.</u>			
Rec'd of Peter Punctual in full of bor-			
rowed money		100	
<u>26th</u>			
Rec'd in full of Abram Perkins, a draught			
on William Johnstone		82	
<u>28th</u>			
Taken up my note to Nicholas Grocer, of			
641.80, as follows :			
Paid in money	423.		
in a draught on Henry }	218.80		
Stewart at sight		641	80
<u>31st</u>			
Paid charges this month		47	
<u>January 2d, 1797.</u>			
Sold Robert Dunston at 45 days			
37 Rolls Tobacco, 518 lb at .17	88.06		
23 fides Sole Leather 299 lb. .21	62.79		
12 Lumps Sugar 146 lb. .29	43.34		
		194	19
<u>12th</u>			
Rec'd of Jonathan Brewster 120 bush.			
Wheat, at 1.25 per. Bushel, in part		150	

# BOOK-KEEPING.

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## WASTE-BOOK.

(7)

<i>January 18th.</i>		§	//
1	Sold George Gordon 1 Hhd. Rum 126 gallons at 1.45 per gall.	182.70	
13	Rolls Tobacco 195 lb. at .17 per lb.	33.15	
	to pay at 30 days		215 85
<i>25th</i>			
1	Rec'd advice from Henry Stewart, New-York that he hath sold my Flaxseed— Nett proceeds pr. account of sales transmitted me, amounting to 541.13, for which received a post bill on Albany bank in full	322 33	
	<i>31st</i>	32	57
1	Paid charges this month.		
<i>February 2d.</i>			
1	Sold Andrew King 1 Hhd. Rum 119 gallons at 1.50. per gallon 178.50 10 fides Sole Leather 130 lb. at .21 27.30 for which rec'd his note at 90 days—	205 80	
<i>6th</i>			
1	Bartered with Derick Hough of Vermont as follows: viz. 1 chest Tea 353 lb. at .42 pr. lb. 182.26 350 lb. Tobacco at .18 pr. lb. 63. Delivered.	245 26	
	For 1300 lb. Cloverseed at .12 pr. lb. 156 600 Bushels Rye at .90 per Bush. 540 Received,	696	
<i>10th</i>			
1	Bought 750 Bushels Wheat of Thomas Taylor at 1.25 pr. Bushel, for which paid as follows: Cash 337.50 My note at 3 months 600.		937 50



(8)

## WASTE BOOK.

<u>February 13th.</u>		<del>88</del> 11
	Rec'd of Jonathan Brewster in part	100
<u>16th</u>		
	Rec'd of George Gordon 130 Bushels Rye at .90 per Bushel in part	117
<u>20th</u>		
	Sold Joel Kent	
	1 Puncheon Rum 128 gal.	} 192
	at 1.50 per gall.	
	32 sides Sole Leather 45 lb.	} 95.34
	at .21 per lb.	
	10 Rolls Tobacco 120 lb. at 18 pr. lb. 21.60	
	<u>308 94</u>	
	Rec'd as follows in part	
	Cash 115.50	
	Rye 70 Bushels at .90 per Bush. 63	
	<u>178 50</u>	
<u>25th</u>		
	Sold Derick Hough of Vermont pr. his order 1 qr. cask Sherry Wine, 30 gal- lons, at 1.50 per gallon.	45
<u>28th</u>		
	Paid charges this month, including store- house rent 6 months	137 96

Lanfingburgh, 1st September, 1797.

	Sundries Dr. to Stock		88 //
1	Cash for ready money	1500.	
2	Rum 5 Puncheons 600 gallons at 1.25 per gallon	750.	
2	Tobacco 100 Rolls 1400 lb. at .14	196.	
3	Sole Leather 200 fides wt. 3225 lb. at .18 per lb.	580.50	
3	Salt 1500 Bushels at .75	1125.	
2	Sherry wine 4 casks 130 gallons at 1.12 per gallon	145.60	
3	Molasses 4 Hhds. 440 gallons at .60	264.	
4	Bills receivable for John Hamil- ton's note on demand	231.19	
4	William Jones per acct.	97.71	
4	Benjamin Conner per do.	110.	
5		<u>5000</u>	
5	Stock Dr. to Sundries		
5	To Henry Bell per acct.	250.	
5	To John Farrow per do.	75.	
5	To bills payable for my note to Joseph Redfield 15 days to run	375.	
		<u>700</u>	
	--- 6th ---		
1	Cash Dr. to Sole Leather	132.30	
3	Rec'd for 45 fides wt. 630 lb. at .21 pr. lb.	132 30	
	--- 10th ---		
1	Cash Dr. to Bill's receivable	231.19	
4	Rec'd in full of John Hamilton's note	231 19	
	--- 15th ---		
5	Bills payable Dr. to Cash	375.	
1	Paid my note to Joseph Redfield	375	

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## JOURNAL.

		September 20th.		X //	
6	Abm. Cunningham Dr. to sundries	650.50			
2	To Rum for 1 Puncheon 123 gal.				
	at 1.50	184.50			
3	To Salt for 350 Bushels	1.10	385.		
3	To Molasses 1 Hhd. 108 gal. at .75	81.			
	to pay at 30 days			650	50
--- 24th ---					
5	Henry Bell Dr. to Cash	250.			
1	Paid him in full			250	
--- 26th ---					
6	Profit and Loss Dr. to Cash	10.			
1	Paid district Collector for Licence to sell Spirituous Liquors and Wines			10	
--- 27th ---					
6	Wheat Dr. to Cash	564.50			
1	Paid for 376 $\frac{2}{8}$ Bushels at 1.50 pr. bush.			564	50
--- 30th ---					
6	Profit and Loss Dr. to Cash				
1	Paid charges this month			34	15
--- October 3d ---					
	Sundries Dr. to Sole Leather	130.24			
1	Cash		76.24		
4	Bills receivable for James Carey's note				
3	at 30 days for the balance of 37 fides				
	592 lb. at .22 per. lb.	54.		130	24
--- 5th ---					
5	John Farrow Dr. to Cash	75.			
1	Paid him in full			75	
--- 8th ---					
1	Cash Dr. to William Jones	97.71			
4	Rec'd in full			97	71
--- 10th ---					
6	Wheat Dr. to Cash	657.64			
1	Paid for 432 $\frac{4}{8}$ Bushels at 1.50 pr. bush.			657	64
--- 12th ---					
1	Cash Dr. to Benjamin Conner	100.			
4	Rec'd in full.			100	



# BOOK-KEEPING.

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## JOURNAL.

(3)

----- October 14th. -----		¥	//
6	Wheat Dr. to Cash 24.45		
1	Paid charges of shipping 815 Bushels at measure, pr. the Tryall, Capt. Hickok, consigned to him for sales and returns.	24	45
----- 17th -----			
1	Cash to Rum 174.		
2	Rec'd for 1 Puncheon 120 gal. at 1.45 per gallon.	174	
----- 20th -----			
2	Peter Olds Dr. to Salt 660.		
3	For 600 Bushels at 1.10 per Bushel to pay at 20 days.	660	
----- 22d. -----			
4	Bills received Dr. to Sherry wine 100.50 for 2 casks 67 gallons at 1.50 per gall.		
2	fold Joshua Johnston per note at 30 days.	100	50
----- 25th -----			
	Sund. Dr. to Abm. Cunningham 659.85		
6	Wheat 347 Bushels at 1.55 537.85		
4	Flaxseed 10 casks containing 70 bush.		
6	at 1.60 and 1. each for the casks 122.	659	35
-----			
6	Abram Cunningham Dr. to Cash 9.35		
1	Paid the balance due him.	9	35
----- 27th -----			
	Sundries Dr. to Bills payable 641.80		
7	Bohea Tea for 4 chests, nett wt. 1388 lb. at .35 per lb. 435.80		
7	Lump Sugar 600 lb. at .26 per lb. 156.		
5	Bought of Nicholas Grocer, New-York, per my note at 60 days	641	80
----- 29th -----			
1	Cash Dr. to Wheat 1450.		
6	Rec'd of Capt. Hickok in full of nett proceeds on the sales of 806 $\frac{4}{5}$ bush.	1450	

(4) JOURNAL.			
----- October 31st. -----		§	
6	Profit and Loss Dr. to Cash	51.23	
1	Paid charges this month		51 23
----- November 1st. -----			
4	Flaxseed Dr. to Sundries	300.	
3	To Salt 250 Bushels at 1.12 per Bushel.		
	Bartered for 20 casks seed 140 Bushels		
	at 2. per Bushel	280.	
1	To Cash paid for the casks at 1.		
	each	20.	
		-----	300
----- 3d. -----			
	Sundries Dr. to Bills receivable	54.	
6	Wheat 20 Bushels at 1.52 per		
	Bushel	30.40	
1	Cash received of James Carey in		
4	full of his note	23.60	
		-----	54
----- 5th. -----			
6	Profit and Loss Dr. to Cash	5.	
1	Paid charges on my Tea and Sugar		
	this day rec'd from New-York		5
----- 5th. -----			
6	Wheat Dr. to Sundries	1125.96	
3	To Salt for 250 Bushels at 1.12		
	per Bushel	280.	
7	To Bohea Tea 1 chest, nett 349 lb.		
	at .42 per lb.	146.58	
3	To Sole Leather 50 fides 750 lb.		
	at .21 per lb.	157.50	
7	To Lump Sugar 200 lb. at .29 pr. lb.	58.	
2	To Rum 1 Puncheon 120 gallons		
	at 1.48 per gallon	189.44	
2	To Sherry Wine 33 gallons at 1.50	49.50	
1	To Cash paid Joseph Farmer in		
	full for 639 $\frac{4}{5}$ Bushels.	244.94	
		-----	1125 96

## BOOK-KEEPING.

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## JOURNAL.

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		November 10th. -----		¥	//
6	Wheat, Dr. to Cash	792.			
1	Paid for 450 bush. at 1 76 per bush.		792		
		----- 12th. -----			
1	Cash, Dr. to Sundries	816.96			
3	To Molasses, Rec'd for 2 Hhd,				
	218 galls. at .72 per gall.	156.96			
2	To Peter Oids, Rec'd in full,	660.			
			816	96	
		----- 16th. -----			
1	Sundry accounts Dr. to Rum, 18c.				
	Cash in payment of 1 Puncheon,				
	120 galls. at 1.50 per gall.	98,			
4	Bills Rec'd. for Abram Perkins				
2	draught on Wm. Johnston,	82.			
			180		
		----- 19th. -----			
7	Peter Punctual, Dr. to Cash	100.			
1	lent him to be repaid on demand.		100		
		----- 23d. -----			
6	Wheat, Dr. to Cash,	47.10			
1	Paid Shipping charges on 1473 bush. at measure per the Hare, Capt. Johnston, consigned to him for sales and return.		47	10	
		----- 28th. -----			
1	Cash Dr. to Bills receivable	100.50.			
4	Rec'd in full of Joshua Johnston's note.		100	50	
		----- 30th. -----			
6	Profit and Loss, Dr. to Cash,	39.25			
1	Paid charges this month.		39	25	

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## (6) JOURNAL.

December 1st. —		℥	
4	Flaxseed, Dr. to Cash, 4.50.		
—	Paid charges till on board the Ranger, Capt. Greene.	4	50
1	Consigned to Henry Stewart, New-York.		
— 7th. —			
	Sundries Dr. to Wheat,		
2	Rum, 4 Hhds. 488 galls. at 1.25 per gall. and charges on do. from New-York 615.		
1	Cash Rec'd of Capt. Johnston,		
6	in full of nett proceeds on the sales of 1455½ bush. 2600.59½	3215	59
— 12th. —			
7	Jonathan Brewster, Dr. to Sun-		
2	dries, 343.70		
	To Rum for 1 Puncheon 117 galls. at 1.50 175.50		
7	Tea, 1 Chest, 347lb. at .40 138.20		
7	Lump Sugar, 100lb. at .30 30.		
	to pay at 60 days.	343	70
— 15th. —			
7	Henry Stewart, my acct. of Flax-		
4	seed, Dr. to Flaxseed 455.10		
	Consigned to him 30 Casks to sell for my account.	455	10
— 17th. —			
4	Flaxseed, Dr. to Cash, 28.60		
1	Paid Capt Greene for freight and charges.	28	60
— 20th. —			
1	Cash, Dr. to Peter Punctual, 100.		
7	Rec'd in full.	100	

# BOOK-KEEPING.

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## JOURNAL.

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		<i>December 26th.</i>		%		//	
1	Cash, Dr. to Bills receivable, 82.						
4	Rec'd Perkins on Johnston, in full.				82		
		<i>-- 28th. --</i>					
5	Bills payable, Dr. to Sundries 641.80						
1	To Cash,		423.				
8	To Henry Stewart, my account current for my draughts 218.80						
	Taken up my account to Nicholas Grocer.				641	80	
		<i>-- 31st. --</i>					
6	Profit and Loss, Dr. to Cash, 47.						
1	Paid charges this month.				47		
		<i>January 2d, 1797.</i>					
8	Robert Dunston, Dr. to Sund. 194.19						
2	To Tobacco, 37 Rolls, 518lb. at .17 per lb. 88.06						
3	To Sole Leather, 299lb. at .21 62.79						
7	To Lump Sugar, 146lb. at .29 43.34						
	to pay at 45 days.				194	19	
		<i>-- 12th. --</i>					
6	Wheat, Dr. to Jonathan Brewf-						
7	ter, 150.						
	Rec'd. 120 bush. at 1.25 per bush. in part.				150		
		<i>-- 18th. --</i>					
8	George Gordon, Dr. to Sund. 215.85						
2	To Rum, for 1 Hhd. 126 galls. at 1.45 per gall. 182.70						
2	To Tobacco, 13 Rolls, 195lb. at .17 per lb. payable in 30 days. 33.15						
					215	85	

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## JOURNAL.

		-- January 25th. --		℥	//
8	Henry Stewart, my acct. cur.				
7	Dr. to do. my acct. of Flaxseed,	541.13			
	For nett proceeds of 30 Casks per account of sales transmitted me.		541	13	
<hr/>					
1	Cash, Dr. to Henry Stewart,				
8	my account current.				
	Rec'd a post bill in full.		322	33	
<hr/>					
		-- 31st. --			
6	Profit and Loss, Dr. to Cash,	32.57			
1	Paid charges this month.		32	57	
<hr/>					
		--- February 2d. ---			
4	Bills receivable, Dr. to Sund.	205.80			
2	To Rum 1 Puncheon, 119galls.				
	at 1.50 per gall.	178.50			
3	To Sole Leather, 130lb. at .21 per lb.	27.30			
	Sold Andrew King, and rec'd his note at 90 days.		205	80	
<hr/>					
		--- 6th. ---			
8	Derick Hough, Dr. to Sund.	245.26			
7	To Bohea Tea for 1 Chest 353lb				
	at .42 per lb.	182.26			
2	To Tobacco, 350lb. at .18 delivered in Barter.	63.	245	26	
<hr/>					
	Sundries, Dr. to Derick Hough,	696.			
8	Cloverseed for 1300lb. at .12 per lb.	156.			
0	Rye for 600 bush. at .90 per bush. rec'd in Barter.	540.			
8			696		



# BOOK-KEEPING.

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## JOURNAL.

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February 10th.		8	11
6	Wheat, Dr. to Sundries, 937.50		
1	To Cash,	337.50	
5	To Bills payable for my note to Thomas Taylor, at three months in full of 750 bush. Wheat, bought of him.	600.	
			937 50
13th.			
1	Cash, Dr. to Jonathan Brewster, 100.		
7	Rec'd in part.	100	
16th.			
9	Rye, Dr. to George Gordon, 117.		
8	Rec'd 130 bush. at .90 per bush. in part.		117
20th.			
9	Joel Kent, Dr. to Sundries 308.94		
2	To Rum, 1 Puncheon, 128 gall. at 1.50	192.	
3	To Sole Leather, 454 lb. at .21	95.34	
2	To Tobacco, 120 lb. at .18	21.60	
			308 94
Sundries, Dr. to Joel Kent, 178.50			
1	Cash,	115.50	
9	Rye, for 70 bush. at .90 pr. bush.	63.	178 50
25th.			
8	Derick Hough, of Vermont, Dr. to Sherry Wine, 45.		
2	for 1 Qr. Cask, 30 galls. at 1.50 per gall. per order.		45
28th.			
6	Profit and Loss, Dr. to Cash, 137.96		
1	Paid charges this month, in- cluding Store-House rent 6 mo.		137 96



## ALPHABET.

A.	B.	C.
	Bills Rec'able 4	Cash 1
	Bell Henry 5	Conner Benj. 4
	Bills Payable 5	Cunningham A. 6
	Brewster Jona. 7	Clover Seed 8
D.	E.	F.
Dunston Robt. 8		Farrow John 5
		Flaxseed 4
G.	H.	I.
Gordon Georg. 8	Hough Derick 8	Jones William 4
K.	L.	M.
Kent Joel 9	Leather Sole 3	Molaffes 3
N.	O.	P.
	Olds Peter 2	Profit and Loss 6
		Punctual Peter 7
Q.	R.	S.
	Rum 2	Salt 3
	Rye 9	Stock 5
		Sugar (Lump) 7
		Stewart Hen-ry &c. } 7
		Do. do. my account cur. } 8
T.	U.	V.
Tobacco 2		
Tea (Bohea) 7		
W.	Y.	Z.
Wine (Sherry) 2		
Wheat 6		



(1)

## LEDGER.

		Dr.	CASH.		8	//
1796.						
Sept.	1	To Stock,	5	1500		
	6	To Sole Leather,	3	132	30	
	10	To Bills Receivable,	4	231	19	
Oct.	3	To Sole Leather,	3	76	24	
	8	To William Jones, in full,	4	97	71	
	12	To Benjamin Connor, do.	4	110		
	17	To Rum, for 1 Puncheon, 120 galls.	2	174		
	29	To Wheat, per Capt. Hickok, on sales,	6	1450		
Nov.	3	To Bills receivable, in full of Carey's,	4	23	60	
	12	To Sundries per Journal,		816	96	
	16	To Rum, in part payment of 1 Puncheon,	2	98		
	28	To Bills receivable in full of Johnston's,	4	100	50	
Dec.	7	To Wheat on sales, per Capt. Johnston,	6	2600	59	
	20	To Peter Punctual,	7	100		
	26	To Bills receivable, Perkins on Johnston in full	4	82		
1797.						
Jan.	25	To Henry Stewart, my acct. current in full,	8	322	33	
Feb.	13	To Jonathan Brewster, in part,	7	100		
	20	To Joel Kent,	9	115	50	
				8130	92	

(1)

## LEDGER.

		Contra	Cr.	£	//
1796.					
Sept.	15	By Bills payable Joseph Redfield,	5	375	
	24	By H. Bell paid him in full	5	250	
	26	By Profit and Loss,	6	10	
	27	By Wheat,	6	564	50
	30	By Profit and Loss,	6	34	15
Oct.	5	By John Farrow in full,	5	75	
	10	By Wheat,	6	657	64
	14	By do. paid shipping charg.	6	24	45
	25	By Abram Cunningham,	6	9	35
	31	By Profit and Loss, paid charges this month,	6	51	23
Nov.	1	By Flaxseed,	4	20	
	3	By Profit and Loss, paid charges on Tea & Sugar	6	5	
	5	By Wheat paid Joseph Farmer in full,	6	244	94
	10	By do. paid for 450 bush. at 1.76 per bush.	6	792	
	19	By Peter Punctual to be paid on demand,	7	100	
	23	By Wheat paid charges of Shipping,	6	47	10
	30	By Profit and Loss paid charges this month,	6	39	25
Dec.	1	By Flaxseed paid charges,	4	4	50
	7	By do. paid do.	4	28	60
	28	By Bills payable,	5	432	
1797.	31	By Profit and Loss,	6	47	
Jan.	31	By do.	6	32	57
Feb.	10	By Wheat,	6	337	50
	28	By Profit and Loss,	6	137	96
March	1	By Balance remaining,		3820	18
				8130	92

	Dr.	RUM.	galls.	¢	//
1796.					
Sept.	1	To Stock for	600	5	750
Dec.	7	To Wheat for	488	6	615
1797.		To Profit and Loss gained	6		235 39
March	1				
<hr/>					
			1088		1600 39
<hr/>					
	Dr.	TOBACCO.	lbs.		
Sept.	1	To Stock,	1400	5	196
1797.		To Profit & Loss gained	6		40 1
March	1				
<hr/>					
			1400		236 19
<hr/>					
	Dr.	SHERRY WINE.	galls.		
Sept.	1	To Stocks,	130	5	145 60
1797.		To Profit and Loss gained	6		49 40
March	1				
<hr/>					
			130		195
<hr/>					
	Dr.	PETER OLDS.			
Oct.	20	To Salt, at 20 days,	3		660



# BOOK-KEEPING.

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## LEDGER.

(2)

		Contra	Cr. galls.	¢	¢
1796.					
Sept.	25	By Abram Cunningham,	129 6	184	50
Oct.	7	By Cash at 1.45 per gall.			
		for	120 1	174	
Nov.	5	By Wheat at 1.48 per do.	120 6	189	44
	16	By Sundries,	120	180	
Dec.	12	By Jonathan Brewster at			
1797.		60 days for	117 7	175	50
Jan.	18	By George Gordon,	120	182	70
Feb.	2	By Bills receivable,	110	178	50
	20	By Joel Kent,	128 9	192	
March	1	By Balance remaining at			
		prime cost,	115	143	75
			1088	1600	39
<hr/>					
1797.		Contra	Cr. lbs.		
Jan.	2	By Robert Dunston for	518 8	88	16
	18	By George Gordon,	195 8	33	15
Feb.	6	By Derick Hough,	350 8	63	
	20	By Joel Kent,	120 9	21	60
March	1	By Balance at prime cost	217 9	30	38
			1400	236	19
<hr/>					
		Contra	Cr. galls.		
Oct.	22	By Bills receivable for	67 4	100	50
Nov.	5	By Wheat,	33 6	49	50
'97Feb.	25	By Derick Hough,	30 8	45	
			130	195	
<hr/>					
		Contra	Cr.		
Nov.	12	By Cash in full,	1	660	

(3)

## LEDGER.

		Dr. SOLE LEATHER.	lbs.	£	#
1796.	Sept.	To Stock,	3225	5	80 0
1797.	March	To Profit and Loss gained	6		91 7
			3225		672 07
		Dr. MOLASSES.	galls.		
Sept.	1	To Stock,	440	5	264
1797.	March	To Profit and Loss gained	6		42 36
			440		306 36
		Dr. SALT.	bu sh.		
Sept.	1	To Stock,	1500	5	1125
1797.	March	To Profit and Loss gained	6		517 50
			1500		1642 50

(3)

## LEDGER.

1796.		Contra	Cr.	lbs.	℥	///
Sept.	6	By Cash,		630	1	132 30
Oct.	3	By Sundries,		592		130 24
Nov.	5	By Wheat,		750	6	157 50
1797.						
Jan.	2	By Robert Dunston,		299	8	62 79
Feb.	2	By Bills receivable,		130	4	27 30
	20	By Joel Kent,		454	9	95 34
March	1	By Balance remaining at prime cost,		370	9	66 50
				3225		672 07
		Contra	Cr.	galls.		
Sept.	20	By Abram Cunningham,		108	6	81
Nov.	12	By Cash,		218	1	156 96
1797.						
March	1	By Balance remaining,		114	9	68 40
				440		306 36
		Contra	Cr.	bush.		
Sept.	20	By Abram Cunningham,		350	6	385
Oct.	20	By Peter Olds at 1.10 per bush. for		600	2	660
Nov.	1	By Flaxseed,		250	4	280
	5	By Wheat,		250	6	280
1797.						
March	1	By Balance on hand at prime cost,		50	9	37 50
				11500		1642 50



(4)

## LEDGER.

		Dr. BILLS Rec. <i>when payable.</i>					
						¢	//
'96.	Sept. 1	To Stock for J. Hamilton's on demand			5	231	19
Oct.	3	To Sole Leather, J. Carey's	Nov.	3	3	54	
	22	To Sherry Wine, Joshua Johnston's,		22	2	100	50
Nov.	16	To Rum, A. Perkins on Wm. Johnston,			2	82	
'97.	Feb. 2	To Sundries, And'w King's note.	May	3		205	80
						673	49
<hr/>							
		Dr. WILLIAM JONES.					
Sept.	1	To Stock,			5	97	71
<hr/>							
		Dr. BENJ. CONNER.					
Sept.	1	To Stock,			5	110	
<hr/>							
		Dr. FLAXSEED. <i>casks. bush.</i>					
Oct.	25	To Abram Cunningham, for	10	70	6	122	
Nov.	1	To Sundries,	20	140		300	
Dec.	1	To Cash paid charges,			1	4	50
	17	To do. paid do.			1	28	60
					30	210	455 10

# BOOK-KEEPING.

279

LEDGER.

(4)

		Contra	Cr.		
'96.				8	//
Sept.	10	By Cash John Hamil-		1	231 19
		ton's in full,			
Nov.	8	By Sundries in full of			
		James Carey's,		54	
	28	By Cash in full of Josh-			
		ua Johnston's,	1	100	50
Dec.	26	By do. Perkins on John-			
		ston,	1	82	
'97.					
Mar.	1	By Balance for Andrew			
		King's note,	9	205	80
				673	49
		Contra	Cr.		
Oct.	8	By Cash in full,	1	97	71
		Contra	Cr.		
Oct.	12	By Cash in full,	1	110	
		Contra	Cr.		
Dec.	15	By Henry Stewart,	ca. bu.		
		my acct. of Flax-			
		feed,	30 210	7	455 10
			30 210		455 10

(5)

## LEDGER.

		Dr.	STOCK.		£	//
1796.						
Sept.	1		To Sundries per Journal,		700	
1797.						
March	1		To Balance the nett of my estate.	9	6006	24
					6706	24
			Dr. HENRY BELL.			
Sept.	24		To Cash in full,	1	250	
			Dr. JOHN FARROW.			
Oct.	5		To Cash in full,	1	75	
			Dr. BILLS PAYABLE.			
Sept.	15		To Cash paid my note, Joseph Redfield,	1	375	
Dec.	28		To Sundries paid do. to Nicholas Grocer,		641	80
1797.						
March	1		To Balance for my note to Taylor,	9	600	
					1616	80



## BOOK-KEEPING.

281

## LEDGER.

(5)

		Contra	Cr.		¥	¢
1796.						
Sept.	1	By Sundries per Journal,			5000	
1797.						
March	1	By Profit and Loss, nett gain last 6 months,	6	1706	24	
					6706	24
		Contra	Cr.			
Sept.	1	By Stock per account,	5	250		
		Contra	Cr.			
Sept.	1	By Stock per account,	5	75		
		Contra	Cr.			
Sept.	1	By Stock to Joseph Redfield,				
			when pa. Sept. 16	5	375	
Oct.	27	By Sundries to N. Grocer,				
			Dec. 27		641	80
1797.						
Feb.	10	By Wheat to T. Taylor,				
			May 10	6	600	
					1616	80

(6)

## LEDGER.

1796.		Dr. A. CUNNINGHAM.		£	//
Sept.	20	To Sundries at 30 days,		650	50
Oct.	25	To Cash,	1	9	35
				<u>659</u>	<u>85</u>
		Dr. PROFIT & LOSS.			
Sept.	26	To Cash paid for license to retail Liquors, &c.	1	10	
	30	To do. paid char. this month		34	15
Oct.	31	To do. paid do. do.		51	23
Nov.	3	To do. paid do. on my Tea and Sugar,		5	
	30	To do. paid char. this month		39	25
Dec.	31	To do. paid do. do.		47	
'97 Jan.	31	To do. paid do. do.		32	57
Feb.	28	To do. do.		137	96
March	1	To Wheat for short meas. To Stock for neat gain since 1st Sept. last,	6 5	6 1706	30 24
				<u>2069</u>	<u>70</u>
		Dr. WHEAT. bu. lb.			
Sept.	7	To Cash,		564	50
Oct.	6	To do.	1	657	64
	4	To do. paid charges of Shipping,	1	24	45
	5	To A. Cuninghame for	6	537	85
Nov.	3	To Bills rec. for	4	30	40
	5	To Sundries for	45	1125	96
	6	To Cash for	1	792	
	23	To do. paid charges of Shipping,	1	47	10
'97 Jan.	12	To J. Brewster,	7	150	
Feb.	10	To Sundries for		937	50
March	1	To Profit and Loss gained,	6	891	99
				<u>5759</u>	<u>39</u>
				313545	

# BOOK-KEEPING.

283

## LEDGER.

(6)

		Contra	Cr.		¥	//
1796.						
Oct.	25	By Sundries per Journal,			659	85
					659	85
1797.						
March	1	By Rum gained,	2	235	39	
		By Tobacco do.	2	40	19	
		By Sherry Wine do.	2	49	40	
		By Sole Leather do.	3	91	57	
		By Molasses do.	3	42	36	
		By Salt do.	3	517	50	
		By Wheat do.	6	891	99	
		By Bohea Tea gained,	7	99	89	
		By Lump Sugar do.	7	15	38	
		By Henry Stewart, my account of Flaxseed,	7	86	03	
					2069	70
1796.						
Oct.	29	By Cash paid <i>bush. lbs.</i> Capt. Hickok on sales,	806 40	1	1450	
Dec.	7	By Sundries per Journal,	455 30		3215	59
1797.						
March	1	By Balance on hand,	870	9	1087	50
		By Profit and Loss for short mea- sure,	335	6	6	30
					5759	39



(7)

## LEDGER.

1796.		Dr. BOHEA TEA. <i>chests.lbs.</i>	£	//
Oct.	27	To Bills payable,	41388	5 48580
'97.Ma.	1	To Profit and Loss gained,		6 9989
			41388	58569
<hr/>				
		Dr. LUMP SUGAR. <i>lbs.</i>		
Oct.	27	To Bills payable,	600	5 156
'97.Ma.	1	To Profit and Loss gained,		1538
			600	17138
<hr/>				
		Dr. PETER PUNCTUAL.		
Nov.	19	To Cash lent to be repaid on demand,		1 100
<hr/>				
		Dr. JONA. BREWSTER.		
Dec.	12	To Sundries per Journal,		34370
				34370
<hr/>				
		Dr. HENRY STEWART.		
Dec.	15	To Flaxseed to sell for my acct. 30 Casks,		45510
'97.Ma.	1	To Profit and Loss,		8603
				54113

# BOOK-KEEPING.

285

## LEDGER.

(7)

		Contra	Cr.	chefts.	lbs.	£	
Nov.	5	By Wheat, for	1	349	6	146	58
Dec.	12	By Jonathan Brewf-					
		ter for,	1	347	7	138	20
'97 Feb.	6	By Derick Hough,	1	353	8	182	26
March.	1	By Balance remain-					
		ing,	1	339	9	118	65
			4	1388		585	69
<hr/>							
		Contra	Cr.	lbs.			
Nov.	5	By Wheat,		200	6	58	
Dec.	12	By Jonathan Brewf-					
		ter,		100	7	30	
'97 Jan.	2	By Robert Dunston,		146	8	43	34
March.	1	By Balance remain-					
		ing,		154	9	40	04
				600		171	38
<hr/>							
		Contra	Cr.				
Dec.	20	By Cash in full,			1	100	
<hr/>							
		Contra	Cr.				
1797.							
Jan.	12	By Wheat in part,			6	150	
Feb.	13	By Cash do.			1	100	
March.	1	By Balance,			9	93	70
						343	70
<hr/>							
		Contra	Cr.				
1797.							
Jan.	25	By do. my acct. current,			8	541	13
						541	13

(8)

## LEDGER.

1797.		Dr. HENRY STEWART. (my acct. current.)		⌘	//
Jan.	25	To do. my account of Flaxseed,	7	54	13
		Dr. ROBERT DUNSTON			
Jan.	2	To Sundries per Journal,		194	19
		Dr GEORGE GORDON.			
Jan.	18	To Sundries per Journal,		215	85
		Dr. DERICK HOUGH.			
Feb.	6	To Sundries,		245	26
	25	To Sherry Wine per or- der,	2	45	
March	1	To Balance due him,	9	405	74
				696	
		Dr. CLOVER SEED.			
Feb.	6	To Derick Hough, 1300	8	16	



## BOOK-KEEPING.

287

## LEDGER.

(8)

		Contra	Cr.	£	//
1796.					
Dec.	28	By Bills payable for my draught,	5	218	80
1797.					
Jan.	25	By Cash rec'd. in full,	1	322	33
				541	13
		Contra	Cr.		
March	1	By Balance,	9	194	19
		Contra	Cr.		
Feb.	16	By Rye in part,	9	117	
March	1	By Balance,	9	98	85
				215	85
		Contra	Cr.		
Feb.	6	By Sundries per Journal,		696	
		Contra	Cr.		
March	1	By Balance,	1300 9	156	

(9)

## LEDGER.

1797.	Dr.	RYE.	bush.		Rs	//
Feb.	6	To Derick Hough,	600	8	540	
	16	To George Gordon,	130	8	117	
	20	To Joel Kent,	70	9	63	
			800		720	
<hr/>						
	Dr.	JOEL KENT.				
Feb.	20	To Sundries per Journal,			308	94
<hr/>						
	Dr.	BALANCE.				
March.	1	To Cash remaining,		1	3820	18
		To Rum 1 Puncheon 115				
		galls. at 1.25 per gall.		2	142	75
		To Tobacco, 217 lb. at .14		2	30	38
		To Sole Leather 370 lb.				
		at .18 per lb.		3	66	60
		To Molasses 1 Hhd. 114				
		galls. at .60 per gall.		3	68	40
		To Salt 50 bush. at .75		3	37	50
		To Bills receivable for				
		Andrew King's note,		4	20	80
		To Wheat 870 bush. at 1.25		6	108	50
		To Bohea Tea 1 Chest				
		339 lb. at .35 per lb.		7	118	65
		To lump Sugar 154 lb. at .26		7	40	04
		To Robert Dunston,		8	19	19
		To George Gordon,		8	98	85
		To Clo. Seed 1300 lb. at .12		8	156	
		To Rye 800 bush. at .90		9	20	
		To Jonathan Brewster,		7	9	0
		To Joel Kent,			180	44
					011	98

# BOOK-KEEPING.

289

## LEDGER.

(9)

		Contra	Cr. <i>bush.</i>	£	/
March	1	By Balance on hand,	800	720	11
<hr/>					
1797.		Contra	Cr.		
Feb.	20	By Sundries per Journal,		178	50
March	1	By Balance,	9	130	44
				308	94
<hr/>					
March	1	Contra	Cr.		
		By Bills payable to Thomas Taylor,	5	600	
		By Derick Hough, due him,	8	405	74
		By Stock, the nett of my estate,	5	6006	24
				7011	98

X



THE following method of BOOK-KEEPING, by single entry, will be found convenient and useful to Farmers, Mechanics, many Country merchants, and indeed to all whose business and connections are not very extensive.

RULE. Commence the Ledger (which is the only book of account to be used) with a blank alphabetical Index, indented and lettered in the usual form, to be filled with names, and paginal references, as occasion requires. *Nextly*. Open every man's account with his name, written in a fair text hand; then enter the specific articles of debt, and those of

1795.	TIMOTHY FAIRDEAL Dr.	§	//
Jan. 15.	To 45 bushels of Wheat, at 1.50, to be paid in 60 days,	72	50
Mar. 18	To 3 days' work, myself, waggon and team, at 2.25 per day, to transport a load of Salt,	6	75
	To my expences in the aforesaid journey,	4	
May 7.	To 6 days' plowing, 1 man at .50, 1 boy at .30, and 2 yoke of oxen at .50 per day,	7	80
June 10	To 1 barrel of Vinegar, at // 12.5 per gallon,	4	
July 17	To 3 cwt. Bar Iron, at 5.	15	
Aug. 1.	To 2½ days' work, reaping, at .75,	1	87
Sept. 21	To the use of my Cider-mill 4½ days, at .66,	2	97
		114	89

corresponding credit upon the opposite pages of the folio, inserting the dates of the several entries in the left hand column, and the prices carried out in the right hand, in two ruled columns, for Dollars and Cents; allotting the whole, or but a part of a folio, to each man's accompt. *Lastly*. Balance the book, by comparing the sum total of the debit, with that of the credit side, and carrying the difference, whether in favor of debtor or creditor, to its proper page, in a new accompt, unless it should be previously discharged by payment, note of hand, or settlement on book. See the following Specimen.

	1795.	Contra	Cr.	§	//
Mar. 16	By Cash for 45 bushels Wheat,			72	50
April 3.	By do. in part pay for transporting a load of Salt from Albany,			5	56
May 1.	By 10½ yards check'd Linen, at .42,			4	41
27.	By the settlement of my note to Peter Dun,			13	37
Oct. 5.	By Cash for the balance due, <i>or</i>				
Oct. 5.	By your note for the balance due,			19	05
<i>Or,</i>					
Oct. 5.	Reckoned and settled all accounts, and find due to Jonathan Homespun, to balance, §19.05.				
	<i>Timothy Fairdeal,</i>				
	<i>Jonathan Homespun.</i>				
				114	89

## A FEW FORMS IN CLERKSHIP.

*An OBLIGATORY BOND.*

**K**NOW all men, by these presents, that I, R. W. of        in the county of        am held and firmly bound to N. H. of        in the penal sum of        to be paid to the said N. H. his certain attorney, executors or administrators; to which payment, well and truly to be made and done, I bind myself, my heirs, executors and administrators, firmly, by these presents. Signed with my hand, and sealed with my seal. Dated at        this        day of        A. D. 1797.

*The Condition of this obligation is such, That if the above bounden R. W. &c. (Here insert the condition.) Then this obligation to be void, and of none effect; otherwise to remain in full force and virtue.*

*Signed, sealed and delivered, }  
in the presence of }*

*A GENERAL DISCHARGE.*

**R**ECEIVED of L. T. of        twenty dollars, in full of all debts, dues and demands. Witness my hand, this        day of        1797.

*A BILL of SALE.*

**K**NOW all men, by these presents, that I, A. B. of        for and in consideration of        to me in hand paid by C. D. of        the receipt whereof I hereby acknowledge, have bargained, sold and delivered, and, by these presents, do bargain, sell and



deliver, unto the said C. D. (*Here specify the property sold.*) To HAVE and to HOLD the aforesaid bargained premises, unto the said C. D. his executors, administrators and assigns, forever. And I, the said A. B. for myself, my executors and administrators, shall and will warrant and defend the same against all persons, unto the said C. D. his executors, administrators and assigns, by these presents. In witness whereof, I have hereunto set my hand and seal, this  
 day of 1797.

*In presence of*

#### A BILL of DEBT.

**K**NOW all men, by these presents, that I, F. G., of        do owe and am indebted unto J. K. of the sum of        which said sum I promise to pay unto the said F. G. his executors, administrators or assigns, on the        day of        next ensuing.—  
 Witness my hand and seal, this        day of  
 A. D. 1797.

#### A GENERAL LETTER of ATTORNEY.

**K**NOW all men, by these presents, that I, A. B. of        have made, ordained, constituted and appointed, and, by these presents, do make, ordain, constitute and appoint C. D. of        my true and lawful attorney, for me, and in my name, and for my use, to ask, demand, sue for, recover and receive, of and from all person and persons whatsoever, all sum and sums of money, debts, dues, claims and demands whatever, now due, owing or accruing to me, and to give good and sufficient discharges for the same, and to adjust, settle or compound all debts

or demands due to me, and to accept such security or satisfaction for the same as he shall think fit. And I do hereby give and grant to my said attorney, my full and whole power in and concerning the premises, and will ratify and confirm whatever he shall lawfully act or do therein. *In witness whereof*, I have hereunto set my hand and seal, the                      day of  
A. D. 1797.

*Signed, sealed and delivered, }*  
*in presence of*

### A LETTER of CREDIT.

SIR,

**T**HE bearer, Mr. H. T. being on his travels, may have occasion for money: Please to furnish him, as occasions may require, taking his receipts; and your draughts for the value shall receive due honor, from,  
Sir, your humble servant,

C. A.

To Mr. S. J. Merchant, }  
London.

### A LEASE of a HOUSE.

**K**NOW all men, by these presents, that I, J. C. of            in            county, for and in consideration of the sum of            received to my full satisfaction of P. T. of            this            day of            in the year of our Lord, 1797, have demised and to farm let, and do, by these presents, demise and to farm let, unto the said P. T. his heirs, executors, administrators and assigns, one certain piece of land, lying and being situated in said            bounded, &c. (*Here describe the boundaries*) with a dwelling house thereon



standing, for the term of 1 year from this date. To HAVE and to HOLD, to him the said P. T. his heirs, executors, administrators and assigns for said term, for him the said P. T. to use and occupy, as to him shall seem meet and proper. And the said J. C. doth *further covenant*, with the said P. that he hath good right to let and demise, the said letten and demised premises in manner aforesaid, and that he the said J. during said time will suffer the said P. quietly to HAVE and to HOLD, use, occupy and enjoy said demised premises, and that said P. shall have, hold, use, occupy, possess, and enjoy the same, free and clear of all incumbrances, claims, rights and titles whatsoever. In witness whereof, I the said J. C. have hereunto set my hand and seal this                      day of

1797.

J. C.

Signed, sealed and delivered, }  
in presence of }

*An* INLAND BILL *of* EXCHANGE.

~~83~~ 83.34

B. August 17, 1796.

TWENTY days after date, please to pay to Mr. S. B. or order, eighty-three dollars, and thirty-four cents, and place it to my account, as per advice from your humble servant,

E. P.

To Mr. T. W. Merchant, }  
New-York. }

*A PROTEST on an INLAND BILL of EXCHANGE.*

KNOW all men, that I, S. B. on this      day  
of      1796, at the usual place of abode of



Mr. T. W. have demanded payment of the Bill (of which the above is a copy) which the said T. W. did not pay ; wherefore I the said S. B. do hereby protest the said Bill. Dated at New-York, this day of 1796.

*A DEED of BARGAIN and SALE.*

*To all People to whom these Presents shall come, Greeting.*

**K**NOW ye, that I, N. O. of in the county of for the consideration of two hundred dollars, received to my full satisfaction of J. L. of said do give, grant, bargain, sell and confirm unto the said J. L. his heirs and assigns forever, a certain piece or parcel of Land, situated and lying in said containing acres, and bounded, &c.

To HAVE and to HOLD the above granted, and bargained premises, with the appurtenances thereof, unto him the said J. L. his heirs and assigns forever, to his and their own proper use and behoof. And also, I the said N. do for myself, my heirs, executors and administrators, covenant with the said J. L. his heirs and assigns, that at and until the enfealing of these presents, I am well seized of the premises as a good indefeasible estate in *fee-simple*, and have good right to bargain and sell the same, in manner and form as is above written, and that the same is free of all incumbrances whatsoever. *And furthermore*, I, the said N. O. do by these presents, bind myself, and my heirs forever to warrant and defend the above granted and bargained premises to him the said J. L. his heirs and assigns, against all claims and demands whatsoever. In witness whereof, I have hereunto set my hand and seal this first day of January, A. D. 1797. N. O. (L.S.)

*Signed, sealed and delivered, }  
in presence of }*

NOTE. *The foregoing Instrument becomes a MORTGAGE DEED, by annexing a conditional clause like the following: viz.*

*Provided nevertheless, if the said N. O. his heirs, executors and administrators, shall well and truly pay to the said J. L. his heirs, executors or administrators, a certain note of hand, by him the said N. O. well executed, bearing date the                      day of A. D. 1796, for the sum of                      according to the tenor thereof, then this deed is to be void.*

#### A DEED of QUIT-CLAIM.

**T**O all persons to whom these presents shall come, Greeting. *Know ye, that I, R. S. of                      for the consideration of seventy dollars, received to my full satisfaction of B. G. of                      have remised, released, and forever quit-claimed unto the said B. G. all right and title which I the said R. have in and to a certain piece or parcel of land, situated in said                      containing                      acres, and bounded, &c.*

*To HAVE and to HOLD all my right and title in and to said remised, released and quit-claimed premises, with the appurtenances thereof, to him the said B. his heirs and assigns forever, to his and their own proper use and behoof. And furthermore, I the said R. do for myself, my heirs, my executors and administrators, covenant with the said B. his heirs and assigns, that from and after the enfealing of these presents, I the said R. will have and claim no right, in or to the above remised, released, and quit-claimed premises. In testimony whereof, I have hereunto set my hand and seal, this                      day of                      A. D. 1796.*



# APPENDIX.

*A Table, shewing the value of Shillings, Pence, &c. from a Farthing to a Pound, in Federal Money.*

fa.	SC. &c.			NE &c.			NJ &c.			NY &c.		
	£	s	d	£	s	d	£	s	d	£	s	d
1	0.00	4		0.00	3		0.00	2		0.00	2	5
2	0.00	9		0.00	7		0.00	5		0.00	5	
3	0.01	3		0.01			0.00	8		0.00	8	
d.1	0.01	8		0.01	4		0.01	1		0.01		
2	0.03	5		0.02	8		0.02	2		0.02		
3	0.05	3		0.04	2		0.03	3		0.03	1	
4	0.07	1		0.05	6		0.04	5		0.04	2	
5	0.08	9		0.07			0.04	6		0.04	2	
6	0.10	7		0.08	3		0.06	8		0.06	2	
7	0.12	5		0.09	7		0.07	9		0.07	3	
8	0.14	3		0.11	1		0.09			0.08	3	
9	0.16	1		0.12	5		0.10	1		0.09	4	
10	0.17	9		0.13	9		0.11	2		0.10	4	
11	0.19	6		0.15	3		0.12	3		0.11	4	
f.1	0.21	4		0.16	7		0.13	4		0.12	5	
2	0.42	9		0.33	3		0.26	8		0.25		
3	0.64	4		0.50			0.40	3		.37	6	
4	0.85	8		0.66	7		0.53	8		.50	2	
5	1.07	2		0.83	3		0.67	2		.62	5	
6	1.28	7		1.			0.80	7		.75		
7	1.50	1		1.16	7		0.94	1		.87	5	
8	1.71	5		1.33	3		1.07	6		1.		
9	1.92	9		1.50			1.21			1.12	5	
10	2.14	4		1.66	7		1.34	4		1.25		
11	2.35	8		1.83	3		1.47	9		1.37	5	
12	2.57	2		2.			1.61	3		1.50		
13	2.78	7		2.16	7		1.74	8		1.62	5	
14	3.00	0		2.33	3		1.88	2		1.75		
15	3.21	4		2.50			2.			1.87	5	
16	3.43			2.66	7		2.13	4		2.		
17	3.04	4		2.83	3		2.26	8		2.12	5	
18	3.85	8		3.			2.40	3		2.25		
19	4.07	2		3.16	7		2.53	8		2.37	5	
£1	4.28	7		3.33	3		2.67	2		2.50		



# APPENDIX.

*A Table, shewing the value of Foreign and Federal Gold Coins, by weight, from a Grain to a Penny-weight.*

American, British & Portug. Gold.				French & Spanish Gold.			
S. C.	N. E.	N. J.	N. Y.	S. C.	N. E.	N. J.	N. Y.
gr. f. d. q.	f. d. q.	f. d. q.	f. d. q.	f. d. q.	f. d. q.	f. d. q.	f. d. q.
1	0 2	0 2 3	0 3 1	0 3 2	0 2	0 2 2	3 10 3 2
2	0 4	0 5 1	0 6 3	0 7	4	0 5 1	6 20 7
3	0 6	1 0 8	0 10	0 10 3	6	7 3	9 30 10 2
4	0 8	1 0 10	3 1 1	1 2 1	8 1	10 2 1	1 1 2
5	0 10	1 1 1	1 4 3	1 5 3	10 1 1	1 1	4 21 5 2
6	1 0	2 1 4	1 8	1 9 1	1 0	1 1 3 3	7 31 9
7	1 2	2 1 6	3 1 11	12 0 3	1 2	1 1 6 2	1 11 2 0 2
8	1 4	2 1 9	12 2 3	2 4 1	1 4	1 1 9	2 2 1 2 4
9	1 6	3 2	2 6	2 8	1 6	2 1 1 1	2 2 5 2 2 7 2
10	1 8	3 2 2	3 2 9	12 11 2	1 8	2 2 2	2 8 3 2 1 1
11	1 10	3 2 5	13 0 3	3 3	1 10	2 2 4 3 3	3 2 2
12	2 1	2 8	3 4	3 6 2	2 0	2 2 7	3 3 3 6
13	2 3	2 10	3 3 7	13 10 1	2 2 2	10 1 3	6 33 9 2
14	2 5	3 1 2	3 10 3	4 1 3	2 4	2 3 0 3 3	10 4 1
15	2 7	3 4	4 2	4 5 1	2 6	2 3 3 2	4 1 1 4 4 2
16	2 9	1 3 6	2 4 5	1 4 8 3	2 8	3 3 6	4 4 4 8
17	2 11	1 3 9	1 4 8	3 5 0 1	2 10	3 3 8	3 4 7 3 4 11 2
18	3 1	1 4	5	5 4	3 0	3 3 11 1 4	11 5 3
19	3 3	2 4 2	3 5 3	1 5 7 2	3 2	3 4 2	5 2 1 5 6 2
20	3 5	2 4 5	1 5 6	3 5 11	3 4	3 4 4	5 5 3 5 10
21	3 7	2 4 8	5 10	6 2 2	3 6	3 4 7	1 5 9 6 1 2
22	3 9	3 4 10	3 6 1	1 6 6 1	3 8	3 4 9	3 6 0 1 6 5
23	3 11	3 5 1	1 6 4	3 6 9 3	3 10	3 5 0	2 6 3 6 8 2
24	4 1	3 6 4	6 8	7 1 1	4 1	5 2	1 6 6 3 7

## ERRATA.

*In some of the Copies the following Errors are noticed,  
and corrected in the following manner.*

In the Introduction, page xxiii, line 7th, for 93, read 98.

In page 55, line 7th from the bottom, for 4.98 7, read 4.28 6; and in line 9th, for 4.81 4, read 4.10 3.

Correct the running title, from page 82 to page 90; for Subtraction, read Addition.

In page 93, 11th line above Lesson XXI, for *To* 75 *do.* read *To* 57 *do.*

Read the answer to Question 28th, page 227th, 592**bb**: 1002.

In Lesson V of the Second Part, there are a few Examples, under Section 3d and 4th, erroneously wrought; particularly the 5th, 6th and 8th of Sect. 3d, and the 9th and 10th Examples of Sect. 4, which are not so easily corrected in an *Errata*. The man of figures, however, it is hoped, will candidly correct them, and any others which he may find, when he considers the extreme difficulty of publishing the first edition of such a work perfectly correct.

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